MODEL AIRPLANE NEWS

OCTOBER
1937
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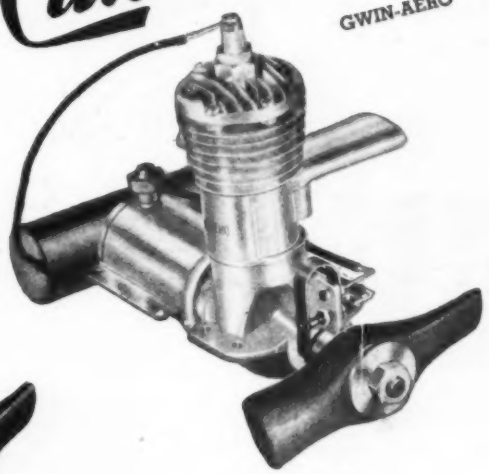

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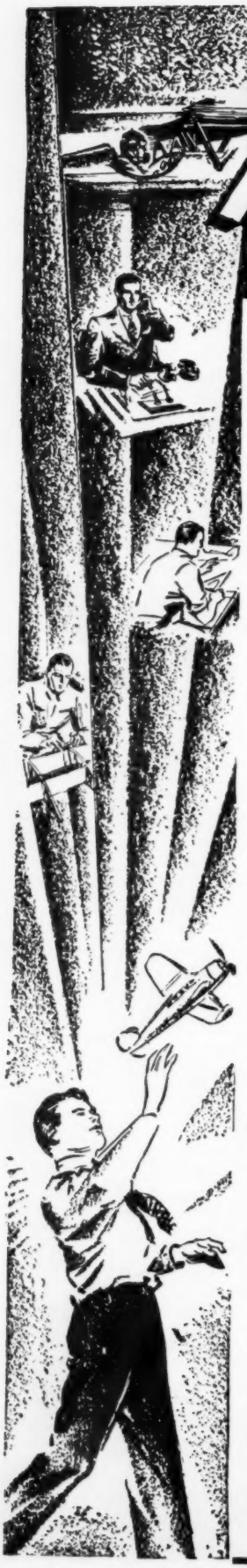

Model AIRPLANE News

9th YEAR OF PUBLICATION

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OCTOBER, 1937

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Look For Interesting and Enlightening Articles on All Phases of Model Aviation

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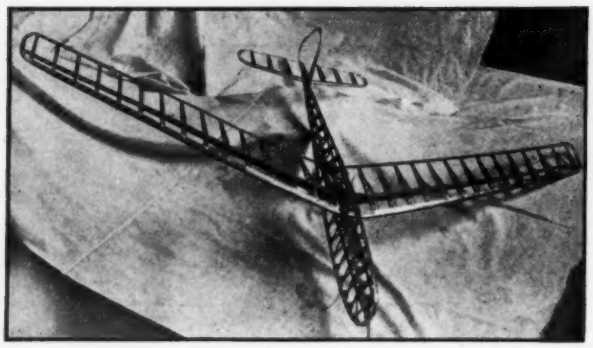
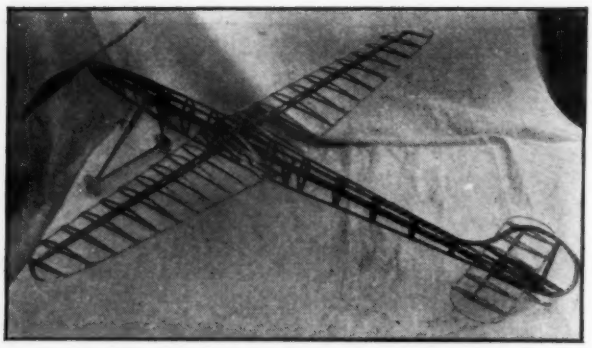


A metal glider with fine structural details



A light rubber-powered model made of metal

New Materials for Model Building

How the Model Designers of Germany Have Developed Efficient Construction Without the Use of Balsa Wood

By HANS JUSTUS MEIER

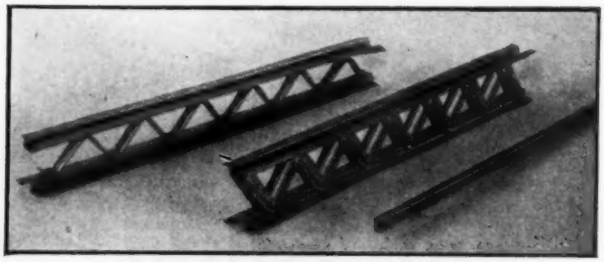
AN ARTICLE by Mr. H. Walther of Bendorf (Germany) under the rubric "Air Ways Here and There" in the November issue of MODEL AIRPLANE NEWS induces me to express my own opinion of this theme, because those lines are likely to have called forth a wrong opinion of the state and the possibilities of German model airplane construction.

It is clear that the prohibition of employing balsa for German competition models has at first caused sorrows of all kinds amongst the model builders. First of all they thought a great decline of the performance of the models to be inevitable. But the contrary resulted! In spite of these new and considerably more difficult conditions they went on improving the efficiencies, though forced to use German hardwood and plywood. Here I should like to state the efficiencies of a recently constructed model that has fine performance, though it is rather a simple design. Its name is H.S.B. 21. It is a "pursuit ship" of the parasol type with a wing span of 130 cm, a length of 102 cm. It flies more than 3200 feet with a speed of about 48 m.p.h., and moreover has fine climbing abilities. The angle of incidence can be altered. The airfoil used is the N.A.C.A. M-11, which is very speedy. (By using balsa its performance would, of course, be improved.) A short glance at the list of German records, too, shows us that these results are not inferior to those of other countries:

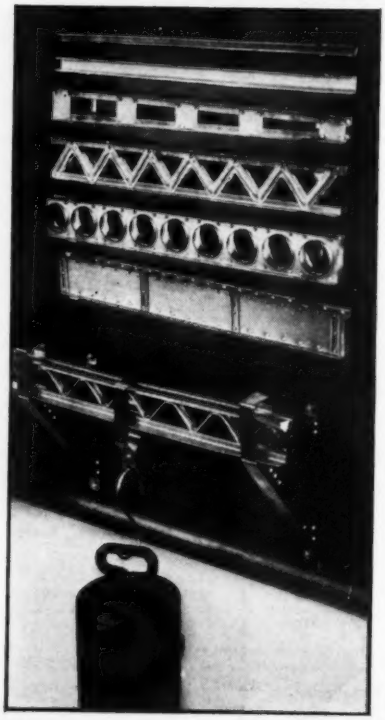
R.O.G.—Distance.....795.5 mtr.
R.O.G—Duration.....13 min. 7 sec.
Launched by hand—Distance.....22,400 mtr.
Launched by hand—Duration.....
.....1 hr. 8 min. 0 sec.

But in order to improve the efficiency and the stability of their models, German builders tried to replace the German hardwood by other materials, and they succeeded in finding a more suitable one.

Here I must state that the so-called "Spantensystem" is the most usual way of fuselage construction over here. That means, that the fuselage is built up without any frame by plywood formers and stringers, which consist of hardwood. This construction is somewhat too heavy, the plywood is not quite invariable against the influences of the weather, and besides it is not entirely unbreakable, though it is considerably stronger than balsa. Now the German model builders have found a substitute for the plywood, and that is "Trolitax," which is practically unbreakable.



A fine example of metal spar construction

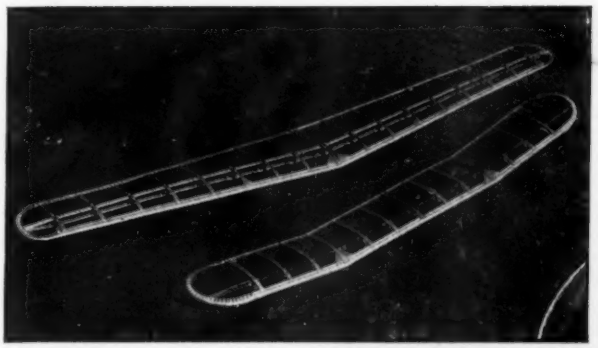


Metal spar types, the lower one showing unbelievable strength

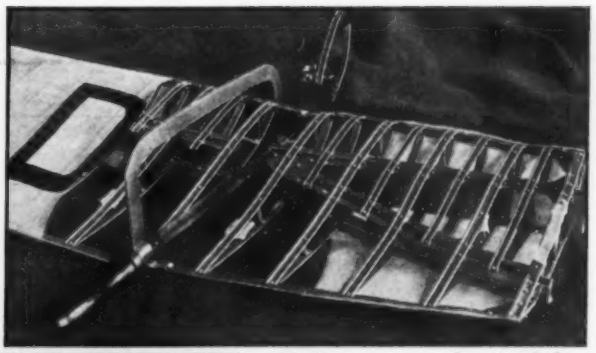
Trolitax is an artificial pressed material that can be sawed, glued, carved and bored; that is all we want. It is a little heavier than hardwood but owing to its great strength it is possible to employ considerably smaller cross-sections of this material than of hard wood and therewith to build, nevertheless, lighter and stronger. It can be used for the construction of formers of the fuselage, ribs and stringers. Samples of "Troli" lay 10 days in water, but after this time it had absorbed only 0.82%. Water and also heat has no influence on its firmness and durability. Models built with this material cannot distort themselves or warp. Besides "Troli" has the advantage of being brilliantly polished and with it of producing very little drag. Thus one has not created a mere substitute but a remarkable improvement.

I should like to mention at this opportunity that the model industry has already taken up this idea and next year a well known firm brings out a model of the Heinkel He 70, which was, for the rest, copied on the front cover of the November issue of M.A.N., and of the Focke-Wulf Fw 56 Stösser, with which Achgelis made his stunt flights at the Thompson trophy race.

But we wished to have much more, namely a substitute that should replace the lost balsa wood. And this material was found, too, though it was originally and is still used for other things. When the German built the airships "Graf Zeppelin" and "Hindenburg" a very light and brand new material was used for the party walls of different rooms; called



The frames of two types of wings made of metal



Cutting away part of a wing before repairing it

"Jsolfros Zellenleimplatte," which means "plate of cellular glue." Strictly speaking this material consists of gelatine into which a certain froth is blown by a patented process. .It has only half the weight of balsa, because it is almost entirely composed of cells. It can be wonderfully worked. Principally it shall be used for fillets and streamline dressing.

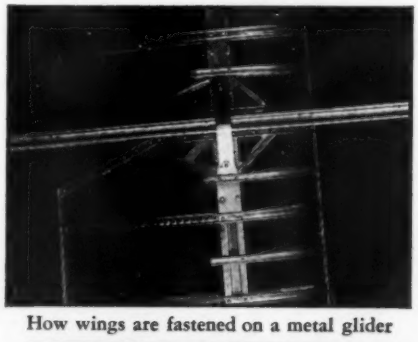
I have mentioned above that we generally build to the "Spantensystem" and here I would like to state an example which shows above all the savings of weight and time of building by using this new material. Two fuselages of the famous World War pursuit ship "Fokker D-7" have been constructed. The length of the fuselage was 550 mm. The first was built to the Former system; that means, that the vaulted upper side of it was formed by formers and stringers. The second had a plate of cellular-glue cemented to the properly quadrangular fuselage. This plate was sanded to shape. The weight of the first fuselage was 35 gr., that of the second 32 gr. The building time of the first was 12 hours, of the second 5 hours. Doubtlessly an improvement!

We are not yet content, but we shall try to make this material also suitable, by the admixture of solid materials, for the making of formers and ribs, for which it is not yet fitted today.

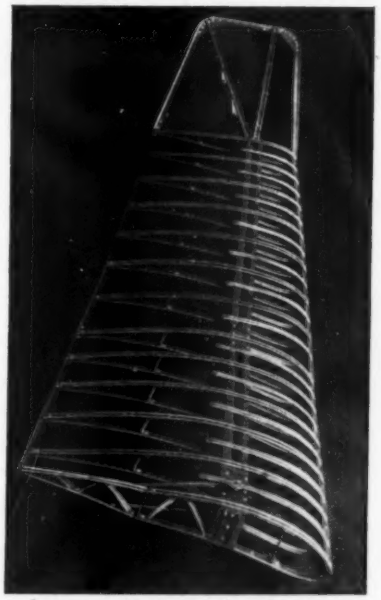
Whilst these two materials did not call forth any changes of the well known methods of model building, another structure was incidentally developed that did employ either stringers or formers; the construction of model airplanes of glued paper.

The process of producing a fuselage of paper is as follows: A form is moulded of clay as one should like to have it. This form is then cast with gypsum. The clay is removed, the gypsum form is well painted with shellac, warmed and rubbed with fat. Then 3-6 layers of newspaper are pasted into this form by an agglutinant of starch. The drying lasts two or three days. Then the fuselage can be taken out of the form and be handled with varnish or cellon. It can be polished, ground off, sanded, bored, etc. This construction is of course very light but nevertheless strong enough to stand the torque of the rubber motor and the landing shocks. It also has the great advantage

Wings ready to be attached to fuselage



How wings are fastened on a metal glider



A fine example of the rib and spar construction of a metal wing

that every form of fuselage can be built, even if it has a most difficult streamline shape, without adding weight.

And now I will write about the most recent and modern material —aluminum.

Some two years ago we heard for the first time that a light alloy could be used successfully for the construction of model planes. These models had to be riveted. And though a large number of well known model builders thought, as always in such cases, that this new method of construction would never be successful because of its greater weight, it has proved, after an incredibly short time, that people cannot only build stronger by this method but also lighter planes. Of course it is quite wrong to think that the construction of metal is suitable for models with short wing span; it is too weighty for them. On the other hand, it will essentially be used for building gas motor ships or gliders. (These often show better performance when they have a higher wing loading!)

The last German competition for gas motor models saw the first all-metal model, that obtained good flights. We all hope that next year a large number of them will to be seen.) Perhaps the American readers will be interested in hearing that the victorious model was equipped with an American motor. It reached a height of 2.800 mtr., had a wing span of 168 cm, a length of 122 cm, a weight of 1.500 gr. and climbed with an angle of about 35 degrees.)

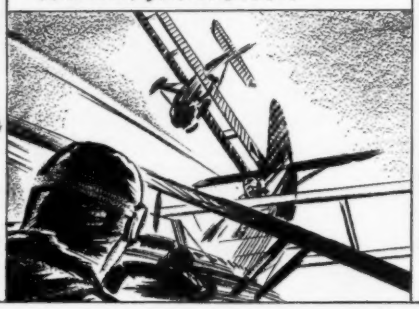
The model builder uses for metal construction a few pliers with which he punches, rivets and bends the different parts. The pliers have several sets to be exchanged and the construction is so extraordinarily clever that you can make, for instance, high speed riveting with one hand. A large number of light alloy profiles are manufactured already and available to the model builder. They make the forming of such spares, etc., possible as they are used in the real airplane industry. And this is the greatest advantage of the light alloy model airplane construction besides the absolute constancy against weather, the great strength of rupture and the wide constructive possibilities. (The photos which were in a

(Continued on page 38)

Heroic Exploits of Aviation

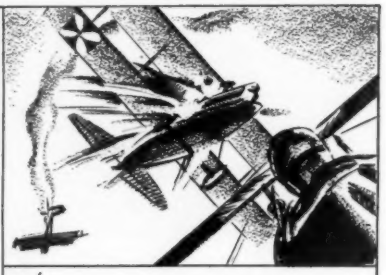
Lieutenant MARCEL VIALLET WAS A YOUNG ARTIST-PILOT WHO PAINTED PICTURES OF HIS AIR BATTLES BETWEEN FLIGHTS. BRAVE THOUGH HE WAS, MISFORTUNE DOGGED HIS WINGS, AND HE RETURNED EMPTY-HANDED FROM MANY PATROLS WITH HIS PLANE RIDDLED WITH BULLET HOLES.

HIS FIRST ENCOURAGEMENT CAME IN AN ENCOUNTER WITH TWO RUMPLERS, OVER AVOCOURT



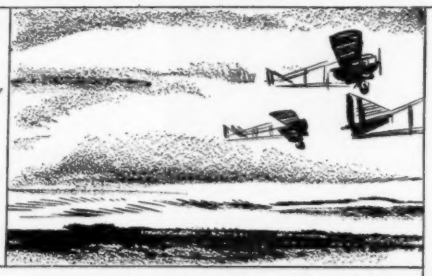
HE DOVE AT THE FIRST, AND HELD HIS COURSE SO LONG THAT THE GERMAN FEARED HE INTENDED TO CRASH BOTH SHIPS

IT WAS VIALLET'S DESPERATE CRAVING FOR VICTORY THAT DROVE HIM ON, AND WHEN PERILOUSLY CLOSE UPON THE HUN, HE BROUGHT HIM DOWN WITH A SHORT BURST OF FOUR BULLETS!



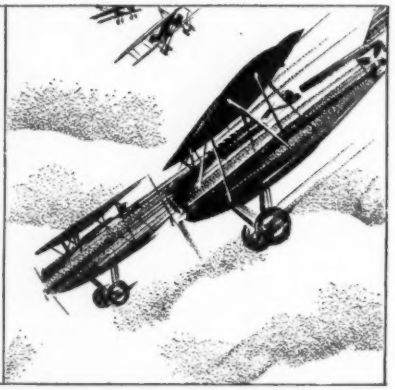
THE OTHER RUMPLER PILOT TRIED TO AVENGE HIS MATE'S DEATH, BUT THE WILD-EYED FRENCHMAN SENT HIM TO A FLAMING DOOM WITH ANOTHER BURST OF 3 BULLETS!

LATER BATTLES, HOWEVER, WERE BARREN OF SUCCESS, AND HE BECAME KNOWN AS "HARD-LUCK PILOT" BY HIS COMRADES

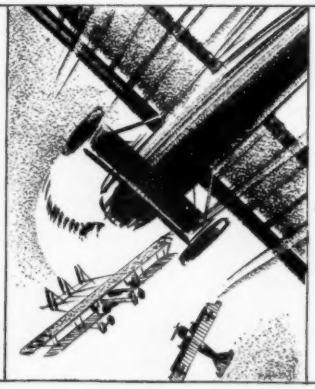


ON APRIL 28, 1916, WHEN THE GHQ OF THE HARD-PRESSED FRENCH ARMY NEEDED PHOTOS, VIALLET TOOK OFF ON THIS MISSION, PROTECTING A CAMERA PLANE. HE AND A YOUNG NOVICE WERE FLYING BI-MOTORED CAUDRON BIPLANES.

WHEN BEHIND THE GERMAN LINES, HE SAW THE RECRUIT TURN AND POWER-DIVE FOR HOME, WITH TWO FOKKERS ON HIS TAIL. WAVED ON BY THE PHOTO PLANE'S GUNNER, VIALLET WENT TO HIS RESCUE, ENGINES WIDE OPEN



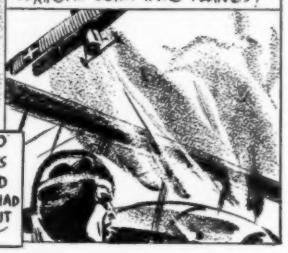
WHEN HE CAME UPON THE GERMANS, VIALLET SUDDENLY REALIZED HE WAS A TARGET FOR A THIRD FOKKER, WHICH HAD BEEN LURKING ABOVE... IT WAS KILLER BOELCKE'S WINGED DEATH!



IT WAS HIS 13TH BATTLE - BOELCKE HAD DOWNED 13 ALLIED PILOTS.. HE WAS 13,000 METERS UP- VIALLET WONDERED IF THESE FACTS MIGHT NOT CONSPIRE AGAINST HIM THAT DAY

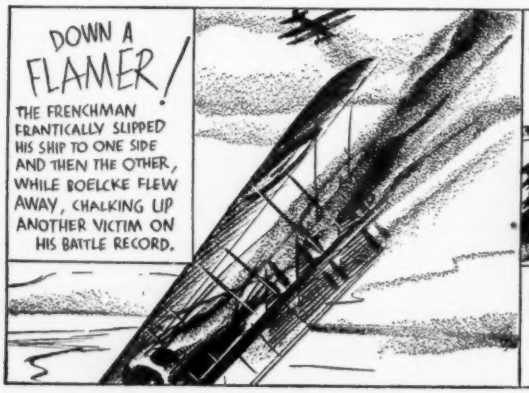
TWISTING AND TURNING, THE TWO DESPERATE MEN FIRED SHORT BURSTS WHENEVER OPPORTUNITY PRESENTED ITSELF. FOR ONE MOMENT, VIALLET HAD BOELCKE AT A DISADVANTAGE, AND PUT A BURST THROUGH HIS FUSELAGE

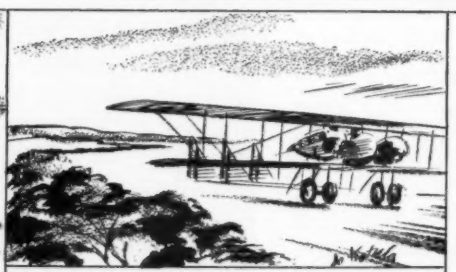
THEN HE WAS CAUGHT IN TURN, AND BOELCKE BLEW HIS RIGHT MOTOR TO BITS. THE OTHER TWO FOKKERS CLOSED IN TO FINISH OFF THE HARD-PRESSED VIALLET, AND HE GROANED AS HE SAW THE LEFT LERHONE BURST INTO FLAMES!



DOWN A FLAMER!

THE FRENCHMAN FRANTICALLY SLIPPED HIS SHIP TO ONE SIDE AND THEN THE OTHER, WHILE BOELCKE FLEW AWAY, CHALKING UP ANOTHER VICTIM ON HIS BATTLE RECORD.





HIS SUPPOSED VICTIM, HOWEVER, WAS FINALLY SUCCESSFUL IN BLOWING OUT THE FIRE, AND LANDED HIS SCORCHED AND RIDDLED PLANE IN A SMALL CLEARING

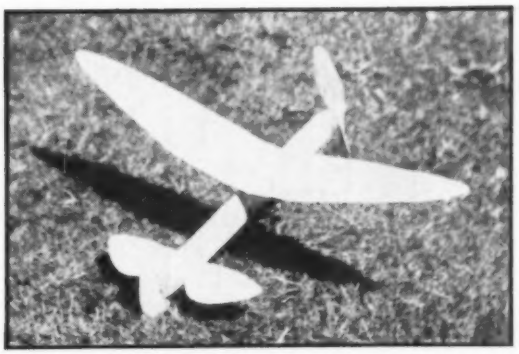
THUS FOILING THE JINX WHICH HAD MADE HIS CAREER ONE OF FRUSTRATION AND DISAPPOINTMENT, VIALLET AFTER THIS BATTLE WAS GIVEN THE NICKNAME OF "THE LUCKY ONE" AND HAVING HIMSELF DOWNED 13 BOCHE PLANES, THEREAFTER CAME TO REGARD THAT HIS LUCKY NUMBER

An All-Balsa Sportster

A Remarkable Flier of Unique Design That Will Give You Many Enjoyable Building and Flying Hours

By STAN D. MARSH

Contributions by Felix Gutmann



This is how it looks when ready to fly. The motor tube fuselage is an unusual feature

THIS model was designed primarily with the purpose of catching the eye of the beginner since it provides a strong, easily constructed job. It is however, also well suited to the expert who likes to experiment with a new, novel design. The reward for constructing this model may be seen by glancing at the flight pictures.

The construction is comparatively simple, there being no built-up surfaces to worry about.

Fuselage

To construct the fuselage obtain a sheet of balsa 1/16" x 4" x 11 5/16". This is the blank from which the fuselage proper will be built. The blank is moistened by steaming over a kettle. It is then bent around a piece of broomstick about 12" long till the edges meet. This will give it a teardrop cross-section. The edges are now cemented together and the whole form wrapped with a gauze strip to hold its shape till dry. It may, at this point, be baked in the oven for about 5 minutes and then left in the oven with no gas till it is dry. This would hasten the process. When it has finally dried, remove the gauze and broomstick form and apply a cement skin along the edge to reinforce it. Now cut out two end bulkheads of 1/4" medium sheet balsa and of the cross-section of the body (see plan). Cut a rectangular hole in each one to accommodate the nose and tail plugs, and then cement one over each end of the fuselage shell. In the nose an added former of 1/16" sheet balsa, hard, with the grain running at right angles to the first may be glued on to increase the strength. The rectangular hole is also cut in this piece. Now take a block of medium-hard balsa 7/8" x 1 1/8" x 1 3/8" for the nose block. Cut a plug 3/8" deep on one of the large sides. This plug is to fit snugly into the opening in the front bulkhead. Now fit the block in place, and using a sharp razor, simultaneously cut to shape the front bulkhead and nose block, rounding them off to the shape shown on the plan. They are finished down with sandpaper and will have the appearance of an integral unit. The tail plug is cut from a block 1 1/8" x 1 3/8" x 1 1/2". A plug is cut in one of the small sides, in much the same manner as the front plug was carved. It is also finished down on the body. The whole fuselage with plugs is now finished down with very fine sandpaper, and is given 3 coatings of banana oil with intermediate sandings.

Obtain 4 large dress snaps and press them into the body at the stations shown on the drawing. These will accommodate the removable landing gear. Cement skins overlapping the edges of the snaps are applied to hold them firmly in place.

Tail Unit

For the rudder, a sheet of 1/16" x 2 1/4" x 3 3/4" soft sheet balsa is used. The outline may be obtained by tracing from the plans. Note the direction of the grain. Taper the rudder to a fine edge towards the tail, and to a blunt edge around the leading edge. Before cementing the rudder to the tail plug, glue in place the .028 music wire tail hook. The hook is bent first, leaving the end straight. Push this end through its proper position in the middle of the tail plug as far as it will go when it comes through at the tail end of the block, bend it into the U shape shown, with a pair of pliers, and then pull on the hook proper till the end lodges completely in the block. Now apply a cement skin to hold it tight. The rudder may now be glued in place. A thin strip of bamboo is glued to the bottom of the rudder as shown. This serves as a tail skid.

The Sportster going places, and gaining altitude

Two pieces of 1/16" x 2 1/4" x 3 5/16" serve as the elevator-half blanks. The outline may also be traced right through the plans onto the balsa, or by the tracing paper-carbon paper method. The halves are of soft balsa and are streamlined in the same manner as the rudder halves. Make marks on the fuselage at the points where the elevator halves meet it and then glue them carefully on these points, holding in place with pins till dry. Two bamboo struts 3 5/16" long are used to brace the tops of the elevator to the fuselage. The removable parts of the tail unit are now the rudder and tail hook, both cemented to the tail block.

Wings

Two wing halves and a center section are cut from 1/16" x 3" sheet balsa; the shape is obtained from the plans the same way as the tail. Eight ribs of 1/16" sheet balsa are cut for the wings while two of 1/8" sheet are cut for the center section. The rib stations are marked off on the wings and the ribs glued in place. The sheet balsa is made to hold its shape till dry by holding with pins to the ribs. When dry the halves are cemented well to the center section. The dihedral angle is 2 1/4" for each wing tip from the center. The wing is finished down with fine sandpaper and given 2 coats of banana oil as is also the tail. The wing clips are bent of .028 music wire and are cemented, one each to each edge of the center section using the heavy 1/8" ribs.

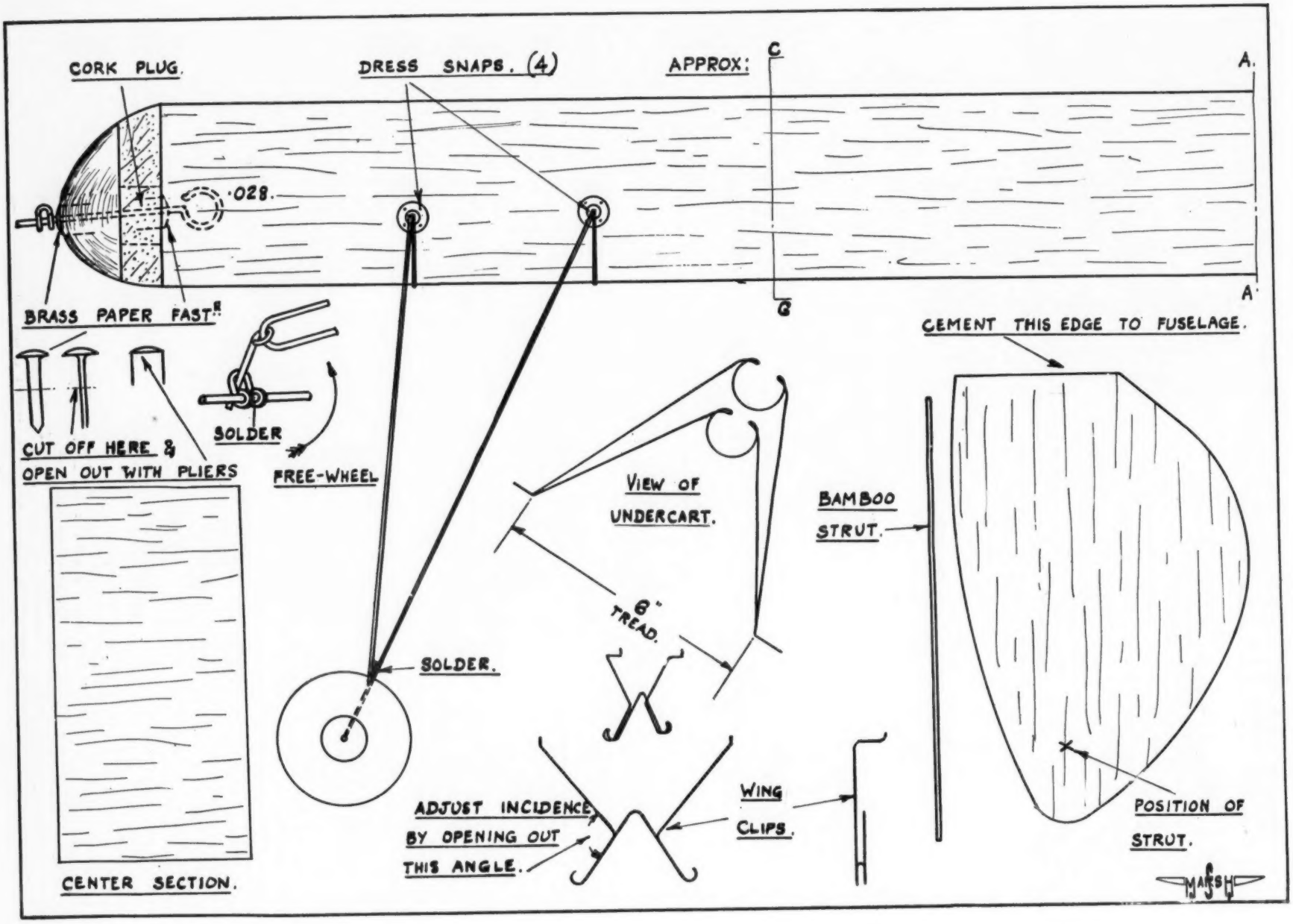
Landing Gear

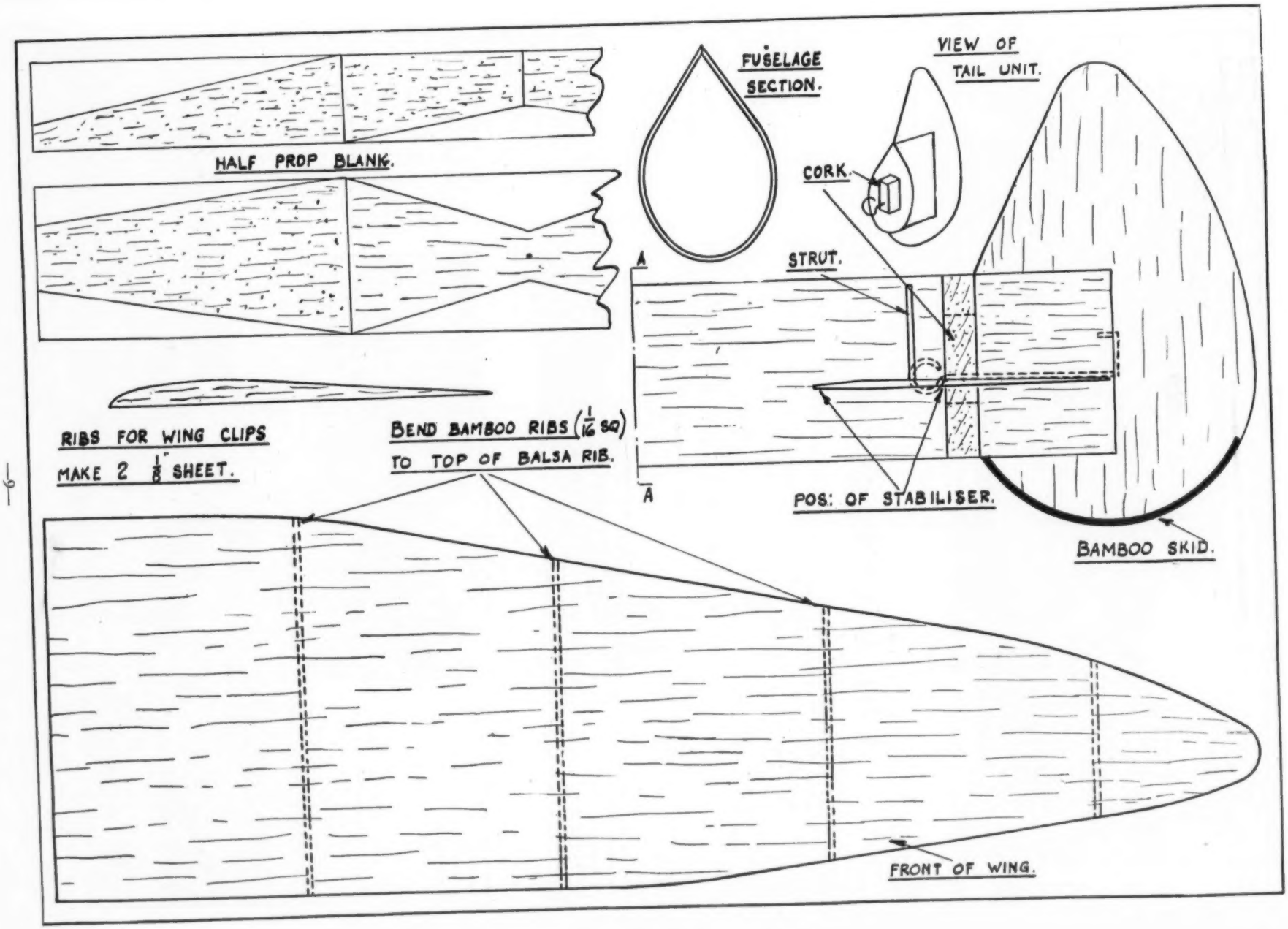
The wheels are 1 1/16" in diameter, and may be bought or cut from 3/16" sheet balsa and streamlined. One brass bushing cemented to each side of each wheel will serve as a bearing. There are 2 landing gear struts of .028 wire. The main strut is longer and is fastened behind, while the supporting strut (soldered to the main strut near the bearings) is in front. Note that the struts stay in place due to their springy action holding the sharp points at the top in the cups of the snaps. After the wheels are put on the axles, the ends are bent back to keep the wheel in place.

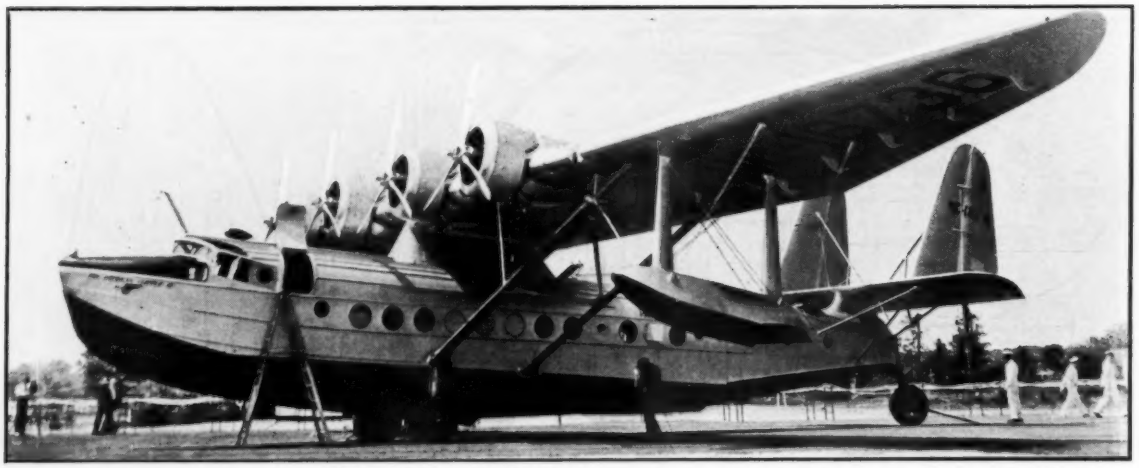
Propeller and Bearing

The propeller blank is of medium hard wood and is 1/8" deep x 1 1/4" wide x 8" long. On the top of the block lay out the symmetrical pattern shown in the broad view. Now cut away all the wood outside of this pattern running straight down to the bottom of the block perpendicular to the edges. This will result in a set of wedge-shaped pieces which are scrap. Now on this form lay out the side view of the block, disregarding the taper. Draw it on

(Continued on page 48)


CORK PLUG.
DRESS SNAPS. (4)
APPROX:
C
A.
.028.
A.
G
BRASS PAPER FASTR.
CUT OFF HERE &
OPEN OUT WITH PLIERS
SOLDER
FREE-WHEEL
CEMENT THIS EDGE TO FUSELAGE.
VIEW OF
UNDERCART.
BAMBOO
STRUT.
6"
TREAD.
SOLDER.
ADJUST INCIDENCE
BY OPENING OUT
THIS ANGLE.
WING
CLIPS.
POSITION OF
STRUT.
CENTER SECTION.
MAFSH


HALF PROP BLANK.
FUSELAGE SECTION.
VIEW OF TAIL UNIT.
CORK.
STRUT.
A
A
RIBS FOR WING CLIPS
MAKE 2 1/8" SHEET.
BEND BAMBOO RIBS (1/16 SQ) TO TOP OF BALSA RIB.
POS: OF STABILISER.
BAMBOO SKID.
FRONT OF WING.



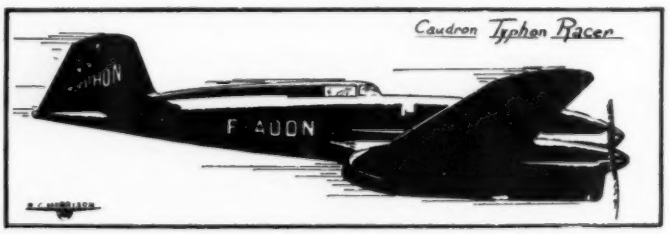
The Sikorsky Pan American Clipper which is making experimental trans-Atlantic trips to England. (Acme)

On Frontiers of Aviation

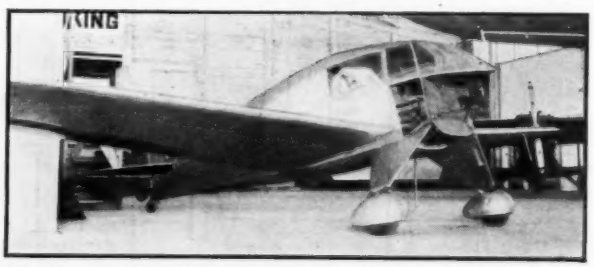
News of the Latest Developments in Commercial, Military and Racing Planes in America and Abroad—How You Can Build a Solid Scale Model of the Caudron "Typhon"

By ROBERT C. MORRISON

IT IS taken for granted that Douglas has been the big money-maker in the last couple of years. At this time last year the company had the enormous sum of $25,000,000 worth of orders on its books. At the same time Curtiss-Wright was quickly emerging from a very poor financial condition. Today when we look at the record we find that the Curtiss company now has $25,000,000 worth of orders—the same that Douglas had just one year ago! In the course of only a few years the concern has risen from bankruptcy into the ranks of the greatest. This sudden rise is attributed mostly to the recent order received from the Army Air Corps for 230 pursuit airplanes The contract price was $4,113,550. This is the largest number of airplanes ever ordered of one type by the Army at any time since the World War. The swift ships are of the very latest design, and as we related in former issues, were in competition with Seversky. The Seversky plane can do 340 m.p.h. so we wonder what these new Curtiss planes will do.

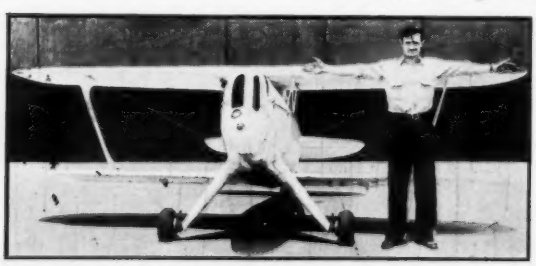


How the super-streamlined Caudron racer looks when in flight

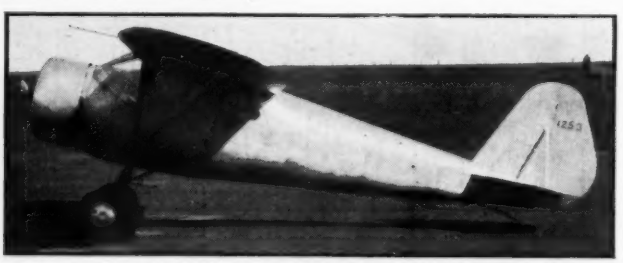


The Rouatter K-6 light plane with 80 hp. engine designed by Chevrolet engine designer. (Morrison from Larkins)

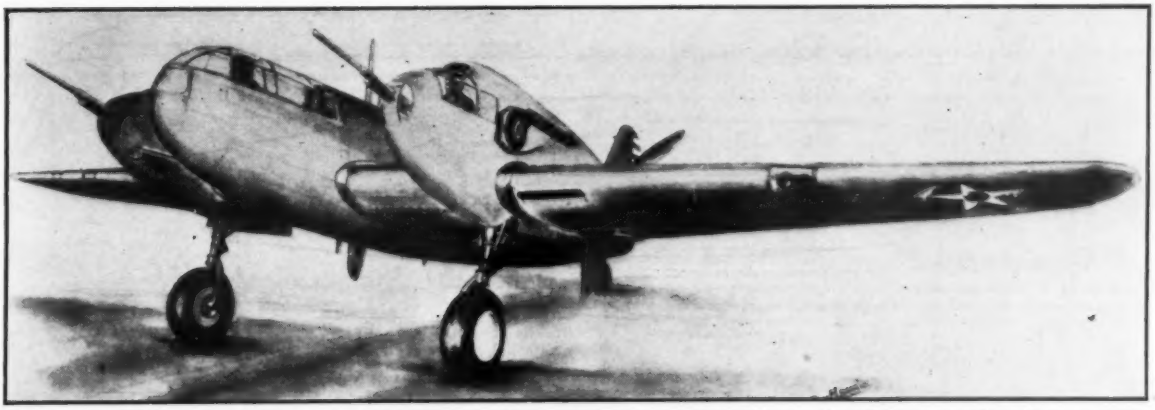
Douglas, who has now reached the $40,000,000 mark in orders, has ordered four newly developed Twin-Row Hornets from the Pratt & Whitney Company for use on the Douglas DC-4 which will be ready for flight tests in the near future. These new engines are of the 14-cylinder radial type and develop 1,400 hp. at 2,500 r.p.m. with 95 octane fuel, and 1200 hp. using 87 octane fuel. Normal rating is 1,150 hp. at 2350 r.p.m. with 95 octane fuel. The engine has successfully passed tests on the company's own dynamometers equivalent to Army and Navy tests as well as actual flight testing. It is the third and most powerful twin-row engine developed by the Pratt & Whitney Company. It is said that Roscoe Turner will



The Payne Aircraft Company's baby biplane, a single seater with only a fifteen foot span. (Acme)



The latest product of Luscomb, the "Sprite" powered with a 125 h.p. engine. (H. G. Martin)



The new experimental Bell Fighter built for the U.S. Army; pusher "props" provide complete firing range from its six guns, manned by a crew of five. (Acme)

use the same type of engine in his new racer.

The Seversky Aircraft Corp. has definitely made a bid for Navy business, having for some time supplied ships for the Army. Their latest creation is a dive bomber that has good chances of winning a contract. Jimmie Taylor, noted especially as a Grumman test pilot, dove the Seversky almost "full out" for 15,000 feet for the U.S. Navy. The ship has the same general appearance of other Seversky airplanes. A 1,000 hp. engine is in the nose.

At a cost of $66,000 each, eleven Blackburn Shark bombers are going to be built by Boeing Aircraft of Canada for the Royal Canadian Air Force. The total price is $726,000.

Many aircraft companies are now busy designing new amphibians and transports for the Army Air corps in the hope that they will get some of the forthcoming orders. Bids will be opened February 24, 1938, for short-range amphibians in lots of one to fifty. Bids on two-engined transport planes will be opened December 28, 1937, for quantities of 1 to 100.

Just how much larger is the Boeing XB-15 than the YB-17 is what most people are wondering. The Army has been successful in keeping much of the details to itself, but we know that the new bomber has a wingspread of a little more than fifty feet greater span than the first four-engined Boeing Bomber; in other words its wingspread is about 165 feet. Eight machine-gun compartments are on the ship and many thousand pounds of bombs may be carried.

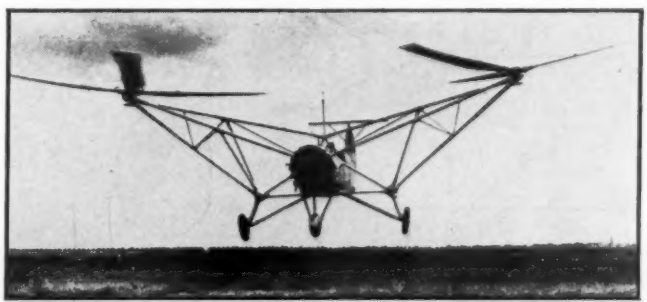
Allan Lockheed is well under way with his new ship at the Oakland Airport in California. It will be named the Alcor as his other ship was and will have the same engine arrangement—two Menascos laid on their sides close together in the nose of the plane. This time it will be a low-wing airplane and covered entirely with plywood. The wing, like Vance Breese's new ship, will be monospar and of sharp taper.

Preludes of the forthcoming National Air Races: Earl Ortman is having his big Kieth Rider "souped up." Rudy Kling's new racer looks somewhat like Harold Neumann's former Folkerts Special of 1936 fame. The new Kling ship will have more power, will be larger, and of course will be faster. Harry Crosby is making swift progress with his all-metal craft. Students of the Curtiss-Wright Technical Institute have been doing some work on it, and the Lockheed company, it is said, is doing most of the heat treating of its parts.

A small Pobjoy-powered racer built by the employees of the Consolidated Aircraft Corp. may be on hand to show a surprising performance for such a small plane.

Over in France activities have reached a feverish height as plans are readied for the largest air race ever to be staged. It is the sub-

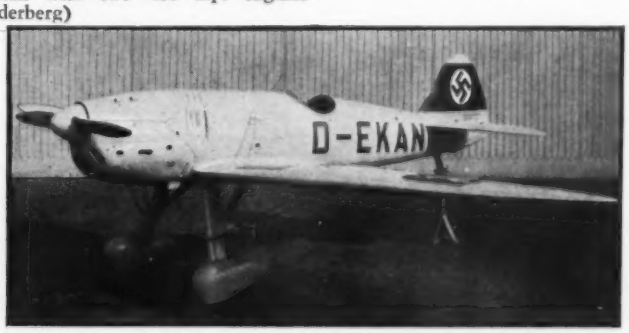
(Continued on page 49)



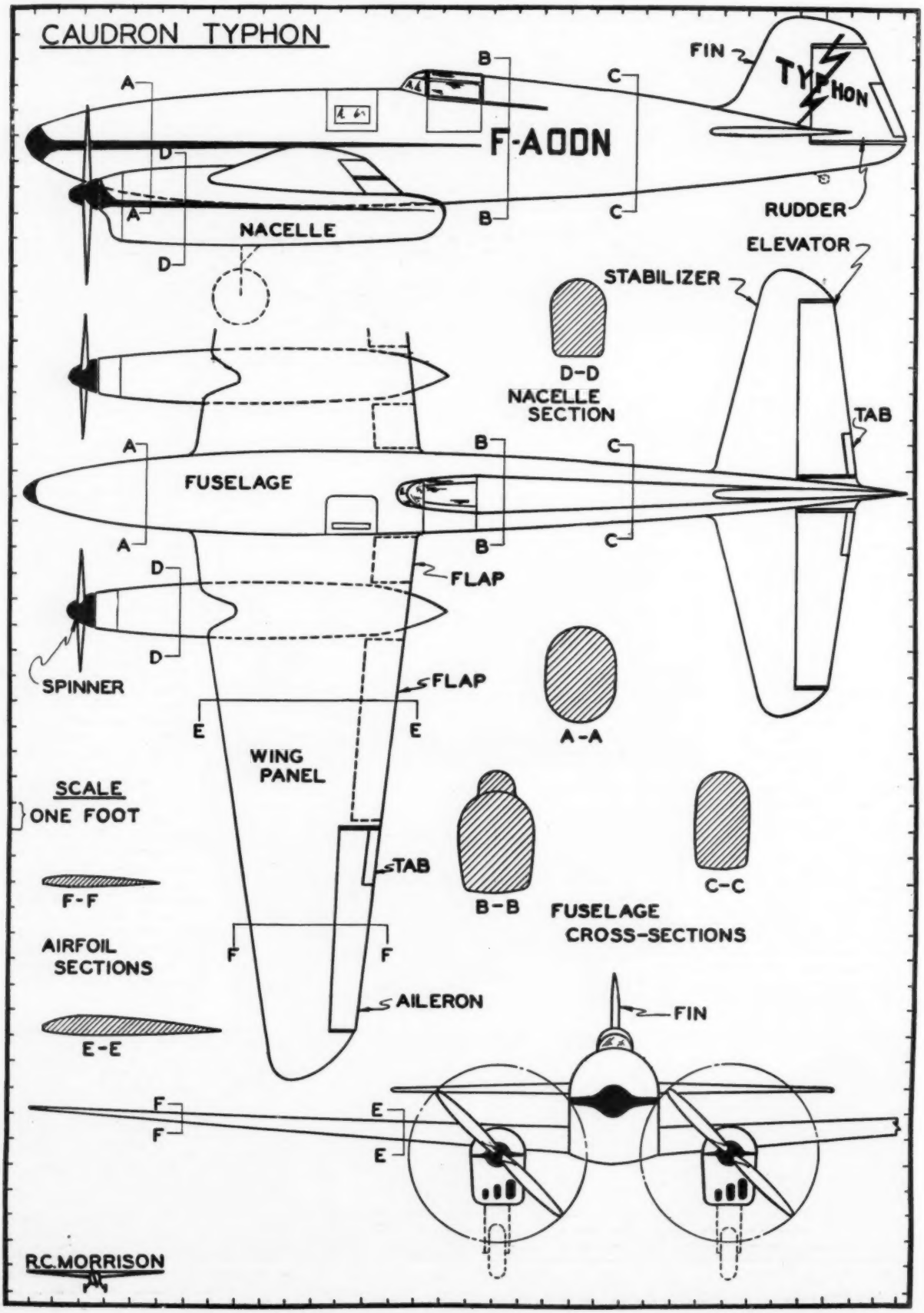
A new type double autogiro taking off from Bremen Airport, Germany, on a test flight. Note the complicated structure required. (Acme)

The Grumman G-2 Amphibian with two 400 h.p. engines (Soderberg)

One of the latest four-motored Russian bombers (and transports) that carried Arctic explorers to the Pole. (Sovfoto)



A super-streamlined German Henschel H.S. trainer with a 125 h.p. engine. A great change from the old Jennies. (By McRae, Jr.)


CAUDRON TYPHON
FIN
TYPHON
F-AODN
RUDDER
NACELLE
ELEVATOR
STABILIZER
D-D
NACELLE
SECTION
TAB
FUSELAGE
FLAP
SPINNER
FLAP
A-A
WING
PANEL
SCALE
ONE FOOT
TAB
F-F
B-B
C-C
FUSELAGE
CROSS-SECTIONS
AIRFOIL
SECTIONS
AILERON
E-E
FIN
R.C.MORRISON

Stabilizing Your Duration Model

Chapter No. 5

How to Design the Tail Surfaces and Landing Gear in Order to Insure Stability With Efficiency

Article No. 66

By CHARLES HAMPSON GRANT

IN THE case of duration planes, performance is the first thing that must be considered by the model designer. Of course, stability is an extremely important element. However, if the model is properly proportioned to give good performance, usually it is not difficult to make it very stable also. The performance of a model is governed chiefly by its shape or external contours. Stability may be induced in such a ship by locating the center of gravity and the centers of areas carefully while designing its external shape for performance. In the last few articles of this series, we have followed through the design of a duration model to the point of incorporating the final features which give the model proper stability. While creating this design, performance has been the chief objective. The span, the tail moment arm and the nose length were established from the standpoint of performance. The plane was designed as a parasol type insomuch as this feature increases the climbing capacity of a model.

Stability features were incorporated whenever doing so would not detract from the performance quality of the ship. A long mement arm was established, for instance. This not only increases the motor length which increases performance, but it insures longitudinal stability. In respect to performance, parasoling the wing increases the climbing capacity of the model and on the other hand it increases the longitudinal and latitudinal stability of the model. Thus this one feature improves the airplane in two respects.

Two features which increase the stability of the plane to a great extent but which have little effect on the performance are the locations of the center of gravity and the center of lateral area. The problem is to design the whole model so that these centers will seek a position which will induce stability. This is a problem worthy of a designer of long experience. The novice should not expect to be able to produce a model which will have these centers located at the most efficient points when his ship is completed. Often it is required that the tail, nose or wings be weighted in order to bring the center of gravity at the desired place. The center of lateral area may be approximately located in a low position by keeping the line of thrust high in the fuselage and bellying down the underside of the fuselage as shown in figure No. 127. These points have been considered in the duration model outlined in the last few articles. The whole design tends to produce a low center of gravity, i. e., the center of gravity is considerably below the center of lift. The line of thrust has been made high so that it is above the center of gravity. This insures a good glide at the end of the flight. The center of lateral area has been kept low by bellying down the lower part of the fuselage and making the area of the wheels quite large. This insures spiral stability or that stability which induces a plane to right itself when it executes a tight circle.

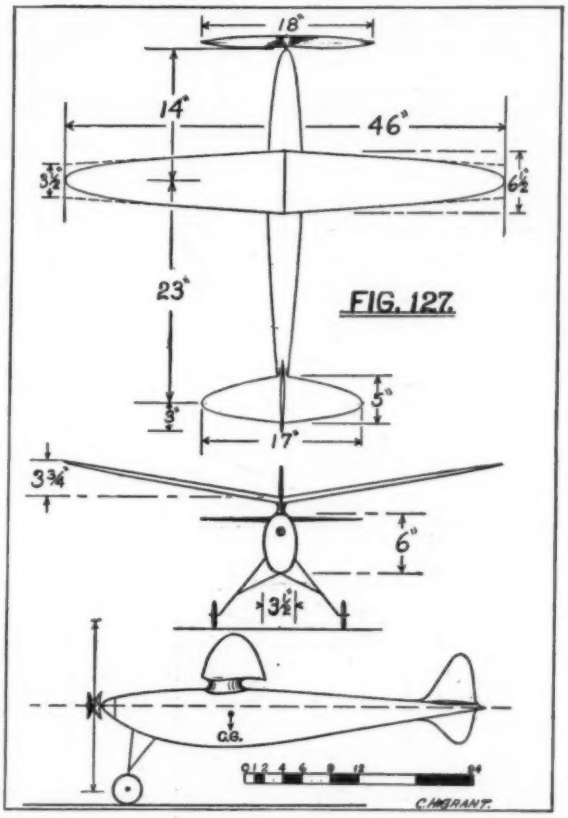


FIG. 127.

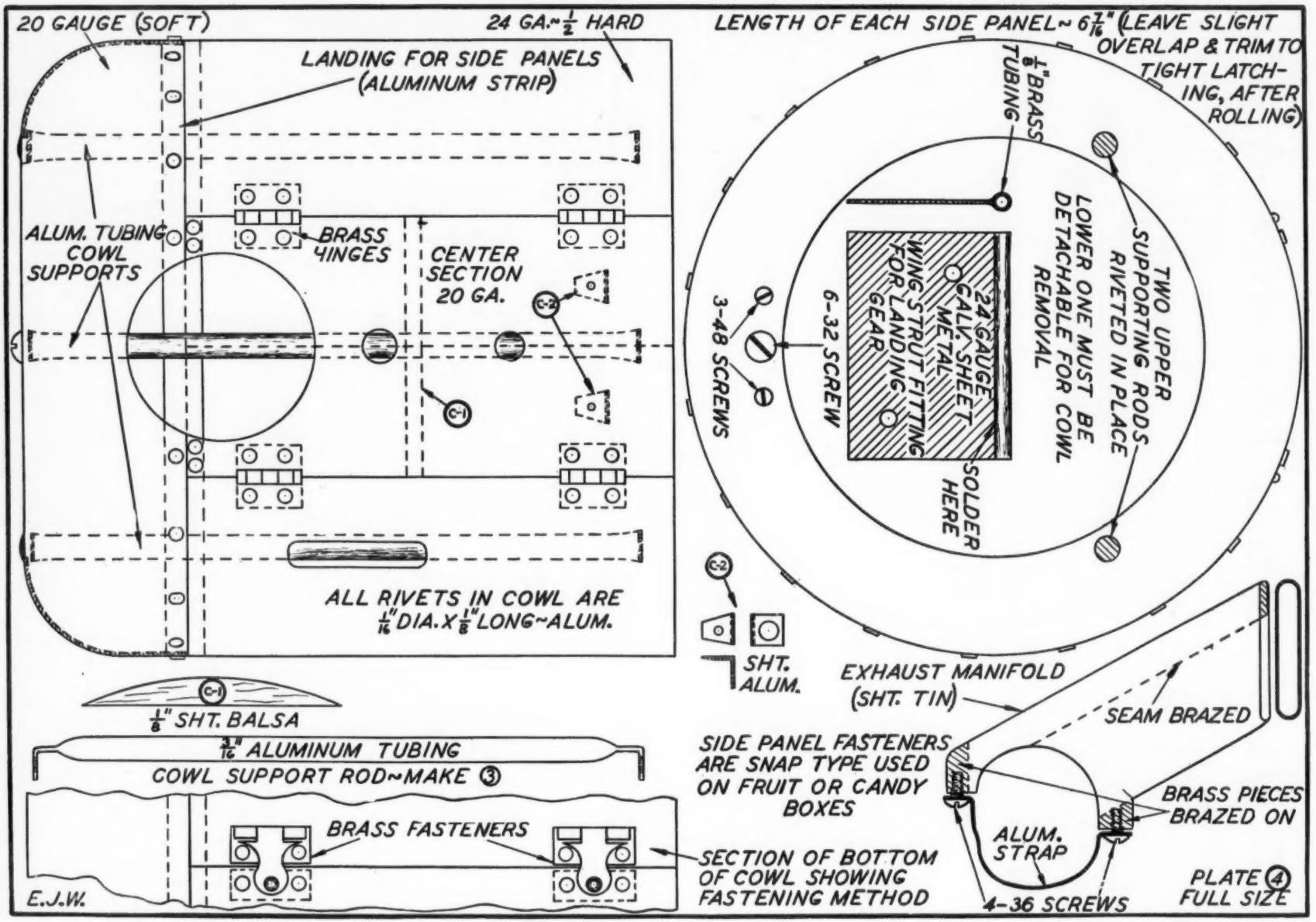
Designing the Tail Surfaces

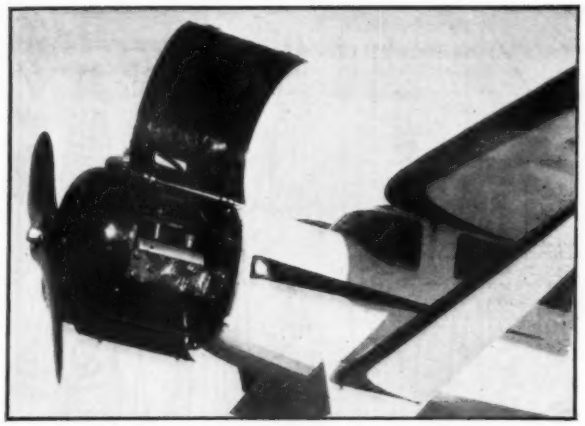
Our problem now is to design the tail surfaces. On any model airplane these exist purely for stability purposes. Of course on large ships they serve as a medium of controlling the airplane. By means of control from the cockpit, small sections of the tail surfaces are moved by the pilot so that the airplane may be directed. On a model these surfaces are fixed and they must be of the proper size, proportion, shape and angle to the wing to generate the corrective forces when the airplane is displaced from its normal flight position. On large airplanes the pilot moves the controls and parts of the tail surfaces to make correction. On models the tail surfaces must correct the ship without any change in position or attitude. For this reason tail surfaces on models usually are larger in proportion to the rest of the ship than in the case of full-sized aircraft.

Generally speaking the tail surfaces consist of a fin and stabilizer. The fin performs the function of insuring directional stability. We shall let this be our first consideration. In designing the fin we know that it must be of certain size in order that it will function properly. If it is too large the model will have a tendency to "dive in" on a turn; if too small, the ship will oscillate when in normal flight. Here is a general rule which usually satisfies all conditions. Those who do not wish to go into mathematical calculations may follow this with assurance that the results will be effective. Make the area of the fin 10% of the area of the wing. This is the least amount of area which should be used. In the case of the model which we have been designing, it would probably be better to make the fin slightly larger insomuch as a large fin induces the model to turn to the left with the torque of the propeller. A very small amount of fin area would cause the model to fly straight or turn to the right against the torque. It is advantageous, however, to have a duration ship circle with the torque. Therefore, in such cases make the area of the fin 12% of the wing area, which would be 24 square inches in this case.

Next, the general proportions of the fin should be considered. If the fin is too high in proportion to its depth, it will have a tendency to produce rocking from side to side. If it is too low the area will be ineffective in the performance of its required function. Usually a good proportion is a height which is about 1½ times the depth from the front to the rear. Many model builders wonder whether the fin should be placed on the top of the fuselage, beneath it, or partly above and below it. If all the fin is placed above the fuselage it will cause the model to "fall off" out of a stall, diving to one side or the other, usually with the torque. If the fin is placed entirely below the fuselage, it will tend to hold the ship in a stall instead of

(Continued on page 53)


20 GAUGE (SOFT)
24 GA.~½ HARD
LANDING FOR SIDE PANELS (ALUMINUM STRIP)
ALUM. TUBING COWL SUPPORTS
BRASS HINGES
CENTER SECTION 20 GA.
C-2
C-1
ALL RIVETS IN COWL ARE 1/16" DIA. X 1/8" LONG ~ ALUM.
C-1
1/8" SHT. BALSA
3/16" ALUMINUM TUBING
COWL SUPPORT ROD ~ MAKE (3)
BRASS FASTENERS
SECTION OF BOTTOM OF COWL SHOWING FASTENING METHOD
E.J.W.
LENGTH OF EACH SIDE PANEL ~ 6 7/16" (LEAVE SLIGHT OVERLAP & TRIM TO TIGHT LATCHING, AFTER ROLLING)
1/8" BRASS TUBING
TWO UPPER SUPPORTING RODS RIVETED IN PLACE
LOWER ONE MUST BE DETACHABLE FOR COWL REMOVAL
3-48 SCREWS
6-32 SCREW
24 GAUGE GALV. SHEET METAL WING STRUT FITTING FOR LANDING GEAR
SOLDER HERE
C-2
SHT. ALUM.
EXHAUST MANIFOLD (SHT. TIN)
SEAM BRAZED
SIDE PANEL FASTENERS ARE SNAP TYPE USED ON FRUIT OR CANDY BOXES
BRASS PIECES BRAZED ON
ALUM. STRAP
4-36 SCREWS
PLATE (4) FULL SIZE



The engine compartment with cowling raised

The author and the completed ship, ready to fly

A Precision Contest Gas Job

Final Data Which Will Enable You to Complete One of the Most Realistic and Reliable Little Fliers That Ever Turned a Propeller

Part No. 2

By
ELBERT J.
WEATHERS

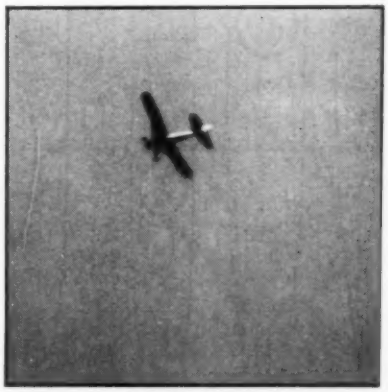
IN THIS second and concluding part, drawing Plates 4, 5, and 6 are included, covering the parts for completion of the plane.

The landing gear ribs are cut out and installed in the landing gear "V's" as shown on Plate 1. These are found on Plate 6. Make sure that all are secure. Corner braces between the ribs and wire may be put in for added cementing area. Cut two ribs from No. 24 galvanized sheet metal and solder well to the piano wire in the correct position. It will be noted that all landing gear ribs are put in parallel to the fuselage, the first one next to fuselage being the only exception. (L-1 follows fuselage longeron.) See Plate 2 for the wing strut fitting detail at the landing gear. Cut four lengths as shown of ⅛" O.D. brass tubing. These are soldered in the positions indicated. A side of each section of tubing should be flattened slightly with a file to insure ease of handling in soldering to the metal ribs.

The battery box, coil and condenser mountings are installed in the fuselage at this point, preparatory to wiring. See Plate 6 for perspective view of battery box. After completing, cement it securely to the cabin floor and also against the 1/16" sheet balsa bulkhead. The coil mounting pieces are made from ⅛" sheet balsa and fit directly against the forward side of the battery box. The condenser mounting brackets are also cut from ⅛" sheet stock and cemented to the cabin floor. Use metallic cement in connection with the installation of the coil and condenser in their respective cradles.

Study the wiring diagram on Plate 1 before beginning the job. Use stranded flexible copper wire, insulated covering of course, in all wiring, with the exception of that between the motor-mount bulkhead MM and the engine, which should be of heavier variety, similar to type used for automobile spark plug wiring, as these three wires (ground, timer and spark plug) are exposed to the gas, oil, etc., which will form to the rear of any engine to some extent after engine has been running. The plug cable should be well insulated by all means.

May the writer point out that the booster batteries in this wiring system are right in on the main line with the flying batteries, which works the best of any method, inasmuch as the booster lines need only be pulled out after motor is running, the flying batteries carrying on in an uninterrupted circuit. To use a booster battery with this system, one merely inserts the booster plugs and turns *ON* the switch and the engine is ready to begin operation. When the main switch is turned *OFF* and booster leads are still inserted in plugs, the current from booster also terminates with that of the flying batteries in the fuselage.



The model in full flight is realistic, stable and a fine performer

Engine Cowl and Exhaust Manifold

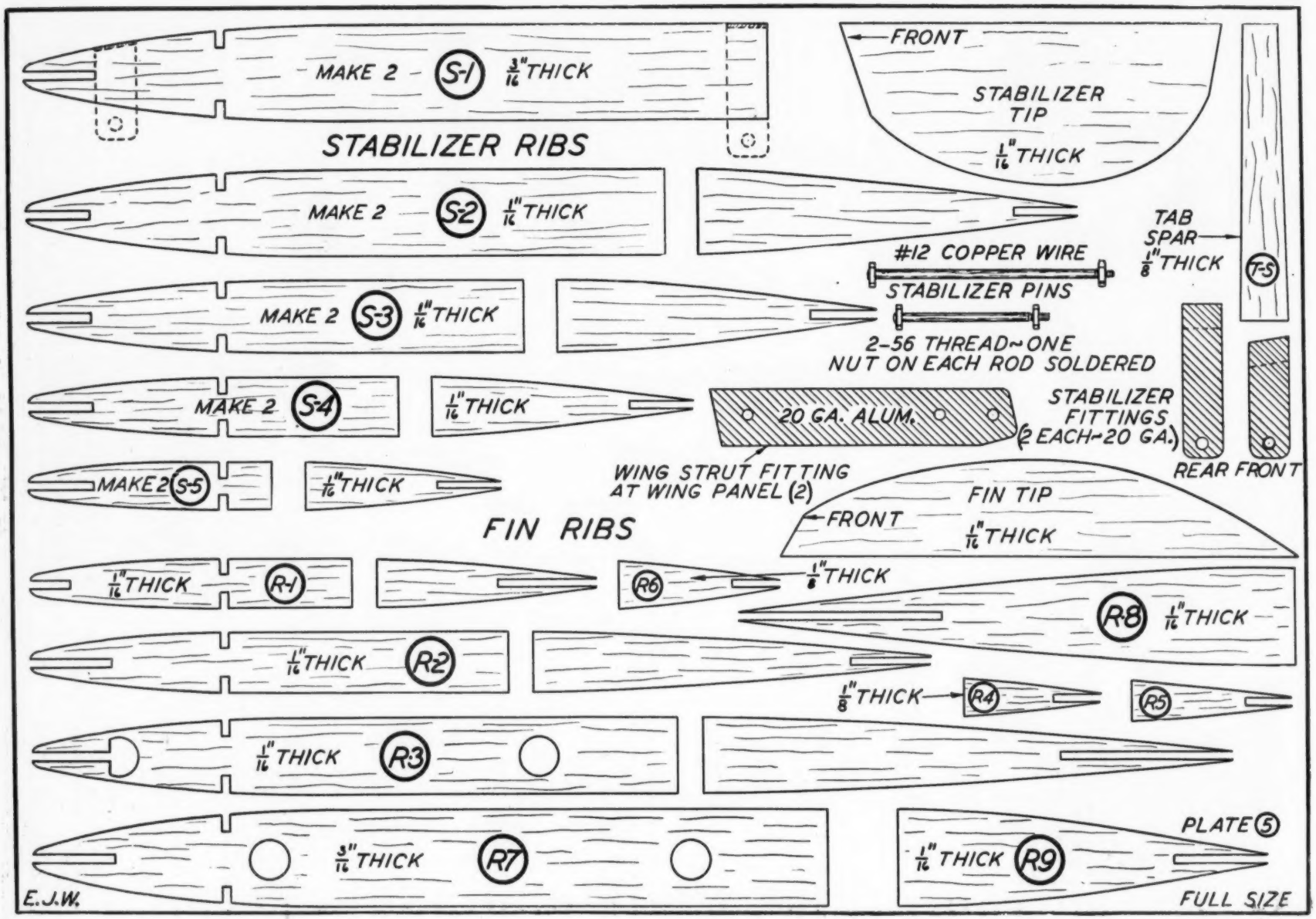
In building the cowl, extreme care must be taken in all operations. This unit will give any gas model builder good practical experience in metal working. The N.A.C.A. type cowl, as used with this ship, will allow better cooling of the engine than the "in-line" type cowling, and it contributes greatly toward the final appearance of the model, giving it a real plane appearance, even to the side panels, which can be raised for inspection, fueling, etc., similar to the N.A.C.A. cowl on the latest Fairchild cabin plane.

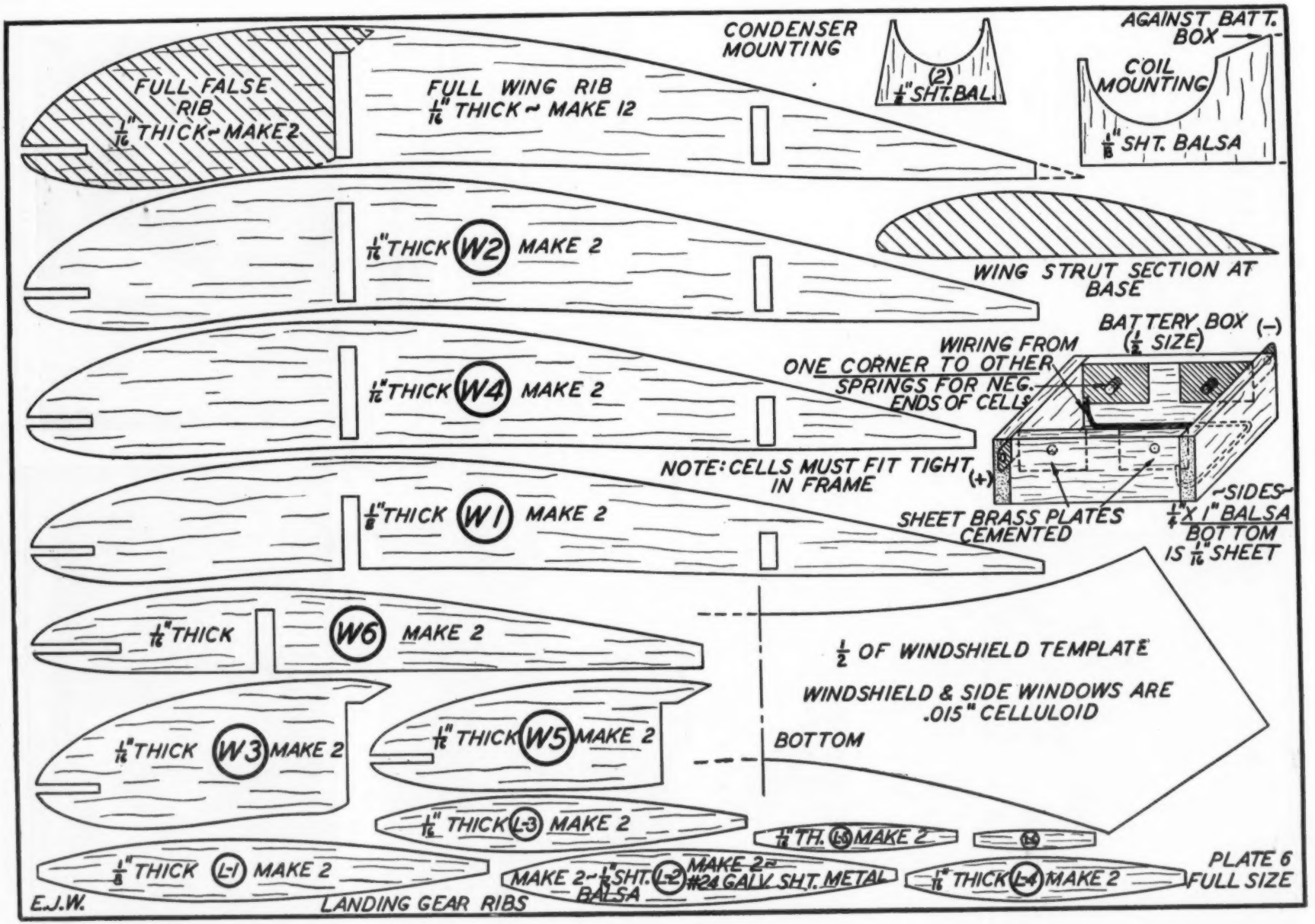
The primary step in the cowl construction is to get the front ring made. This is "spun" on a lathe and due to the easy curve, anyone having access to a lathe can easily make it himself with a little care. If one is not in a position to make it, any metal-working concern in his vicinity which does metal spinning will make it, including the hardwood form, for a very nominal sum.

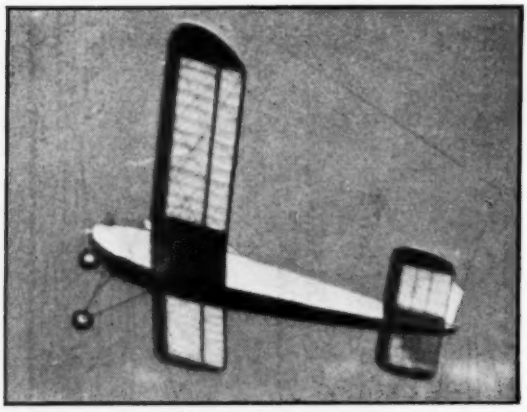
However, if one plans its forming, the first thing to do is to make a hardwood form, turned on a lathe. This should be finished to 4¾" diameter, minus double the thickness of the 20-gauge aluminum forming the ring. In other words, allow for the thickness of the metal in turning the wooden form so that the aluminum ring itself will be 4¾" diameter when completed.

Secure a sheet of very soft (grade used for spinning) 20-gauge aluminum and secure with four screws against the front face of the form. Leave the sheet amply large for completing the ring to the rear edge, but don't leave too much excess, as it will be bothersome in the spinning operation. Begin to work it around the

(Continued on page 44)


MAKE 2 S-1 3/16" THICK
STABILIZER RIBS
MAKE 2 S-2 1/16" THICK
MAKE 2 S-3 1/16" THICK
MAKE 2 S-4
1/16" THICK
MAKE 2 S-5
1/16" THICK
FRONT
STABILIZER TIP
1/16" THICK
TAB SPAR
1/8" THICK
T-5
#12 COPPER WIRE
STABILIZER PINS
2-56 THREAD~ONE NUT ON EACH ROD SOLDERED
20 GA. ALUM.
STABILIZER FITTINGS (2 EACH~20 GA.)
REAR FRONT
WING STRUT FITTING AT WING PANEL (2)
FIN TIP
FRONT
1/16" THICK
FIN RIBS
1/16" THICK R-1
R6
1/8" THICK
R8 1/16" THICK
1/16" THICK R2
1/8" THICK
R4
R5
1/16" THICK R3
3/16" THICK R7
PLATE 5
1/16" THICK R9
E.J.W.
FULL SIZE


CONDENSER MOUNTING
(2) 1/8" SHT. BAL.
AGAINST BATT. BOX
COIL MOUNTING
1/8" SHT. BALSA
FULL FALSE RIB 1/16" THICK ~ MAKE 2
FULL WING RIB 1/16" THICK ~ MAKE 12
1/16" THICK W2 MAKE 2
WING STRUT SECTION AT BASE
BATTERY BOX (-) (1/2 SIZE)
WIRING FROM ONE CORNER TO OTHER
SPRINGS FOR NEG. ENDS OF CELLS
1/16" THICK W4 MAKE 2
NOTE: CELLS MUST FIT TIGHT IN FRAME
(+)
~SIDES~ 1/4" X 1" BALSA
BOTTOM IS 1/16" SHEET
SHEET BRASS PLATES CEMENTED
1/8" THICK W1 MAKE 2
1/16" THICK W6 MAKE 2
1/2 OF WINDSHIELD TEMPLATE
WINDSHIELD & SIDE WINDOWS ARE .015" CELLULOID
BOTTOM
1/16" THICK W3 MAKE 2
1/16" THICK W5 MAKE 2
1/16" THICK L-3 MAKE 2
1/16" TH. L-5 MAKE 2
L-5
1/8" THICK L-1 MAKE 2
MAKE 2 ~ 1/8" SHT. BALSA L-2 MAKE 2 ~ #24 GALV. SHT. METAL
1/16" THICK L-4 MAKE 2
PLATE 6 FULL SIZE
E.J.W.
LANDING GEAR RIBS



"Gas Lines"

Latest News of Members of the International Gas Model Airplane Assn. From All Parts of the World

Interesting Comments on the Attempt to Ban the Flying of Gas Models

Picture No. 1—A three-quarter size (6 ft.) K.G. climbing into the "blue." (Built by Bill Barker)

The I.G.M.A.A. Pin

Picture No. 2—The MODEL AIRPLANE NEWS trophy for radio-controlled flight

BIG guns of both sides of the gas model front have been pounding away. The enemies of gas models have received a severe setback because of the unexpected strength of the opposing forces. They found gas model fans strongly entrenched behind public opinion, with many public spirited and high officials supplying ammunition and man power.

For the benefit of those who are not familiar with the battle which has been going on between the two opposing forces we will make some explanation. On the one side there are the gas model fans and all those who are intensely interested in making America airminded and developing the intelligence of American youth through the unequalled medium of gas model airplanes. On the other side are those who wish to seek personal gain and publicity using gas models as a subterfuge.

It appears that hits can be chalked up for both sides. First of all, gas model fans scored when the Department of Commerce officials decided not to ban gas models. A delegation from the department was sent to the National Model Competition held in July at Detroit. There they witnessed with hawk-like eyes the manner in which the contest was conducted and searched, if possible, for dangers which might result from the flying of gas models. After careful consideration of the matter, they decided that gas models should not be banned and that the restrictions placed upon the flying of gas jobs by the contestants themselves at the present time were sufficient.

We have another bulletin from the front, sent to us by Mr. James Blackton of the Reginald Denny Industries, Inc., 5751 Hollywood Boulevard, Hollywood, Cal. He says:

"We are doing all we can here to offset the very unfavorable publicity issued against gas models. However, we do not worry very much as we have a letter in our files from the Director of Air Commerce, who assures us that the bureau does not contemplate restricting or preventing gas models. On the contrary, it appears that they wish to encourage activities along these lines. They are only concerned with the safety factor and request model builders to take reasonable precautions when flying."

Mr. Blackton goes on to say that he believes that the blast against gas models is due to the fact that a large number of members of the enemy are deserting in large groups to join the I.G.M.A.A. and other organizations which are far more constructive. We may say that if this goes on long enough this will be a one man war.

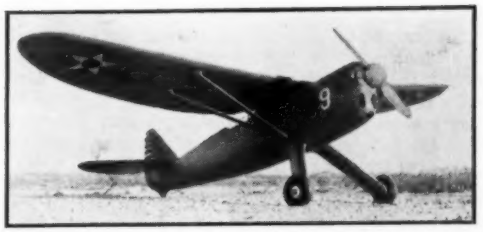
On the other hand, the enemy has scored a direct hit in Massachusetts. It appears that the "restraining" forces have induced the State Registrar of Motor Vehicles, who is the supervisor of all state aviation matters also, to place a ban on the flying of gas

Picture No. 5—A beautifully streamlined 9 ft. job designed by Robert Jeffery along speed lines. He is a speed expert

Picture No. 4—Franklin Dewey, Jr., and his Buccaneer gas model which he entered in the national competition at Detroit

Picture No. 3—Major James Doolittle presents the Gar Wood trophy to Maxwell Bassett for winning the open gas model event

models there. His rule stipulates that no gas model may be flown unless licensed, nor may it be flown by any one unless that person is a licensed pilot. This shot by the enemy has aroused much curiosity. We are wondering what caliber he used in order to create such an impression on this public official which would induce him to restrain aviation activities and airmindedness to this extent. It is very hard to believe that the Registrar of Mass. has been informed of the merits of gas models and what this activity will do in the education of American youth, to say nothing of providing a healthy mental occupation which will no doubt provide more serious-minded business and professional men in the future.



Picture No. 8—A speedy gas job with the lines of a large ship by Peter Westburg

Picture No. 12—A clipped wing speed job by John Jay. It does sixty to seventy miles per hour, its builder claims

We feel, however, that this is merely a temporary victory for the enemy inasmuch as public opinion will always change such situations. However it is very imperative that all gas model enthusiasts and *those interested in the education of the youth of Mass.*, organize and take immediate steps to have this ruling changed. They may be assured that all the members of the I.G.M.A.A. in other states will do everything possible to back them up in such action. We are sure that Mr. Albert Lewis of the Junior Aviation League, Jordan Marsh Company, Boston, Mass., will be glad to have suggestions from other model builders throughout the country or from other countries. Mr. Lewis is also one of the heads of the Boston Gas Model Society, a unit of the I.G.M.A.A.

It is interesting to reflect that usually trouble and dissension comes from the misuse of a particular object or misuse of authority. Misuse usually comes from lack of knowledge of the thing with which one is dealing. A man usually shoots himself because he is not thoroughly versed in the proper way of handling a gun. We get the impression that the Registrar of Massachusetts is in this class concerning gas models. We urge all Massachusetts model builders therefore to make him acquainted in every way with the virtues of this pastime.

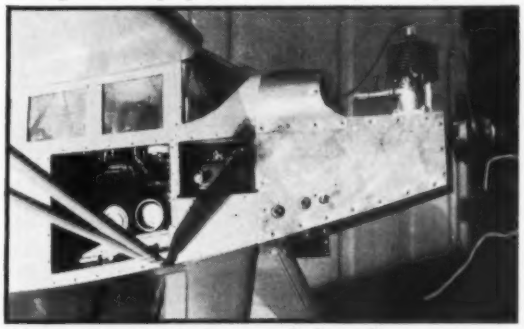
We have several interesting comments on the situation which deserve publication and which we feel members will be most anxious to read. First of all, we have a letter from Betsy K. Sybrant of 12384 Cedar Road, Cleveland Heights, Ohio. We beg you to note that this letter is from a woman who has reached the age of maturity and has had enough experience to thoroughly understand the necessity of proper education. She writes as follows:

"As the aunt of one lad—Bob Nevin, who did some rather commendable model flying with his twin pusher at the National meet held in Akron a few years ago, continuing his model building and at the present time working constantly on gas models in his spare moments away from his work—he is employed by The Glenn L. Martin Company in Baltimore—it does seem as if I might add a bit of first-hand information.

"Since early childhood Bob has been interested in airplanes and model building—he and his friends and fellow model builders, among them Mr. Dick Corda one of the outstanding builders of this city.

"It has been an interest that has claimed their attention to the fullest for years and many times when the boys might have been chasing around perhaps getting into mischief, they have been spending their time at the library

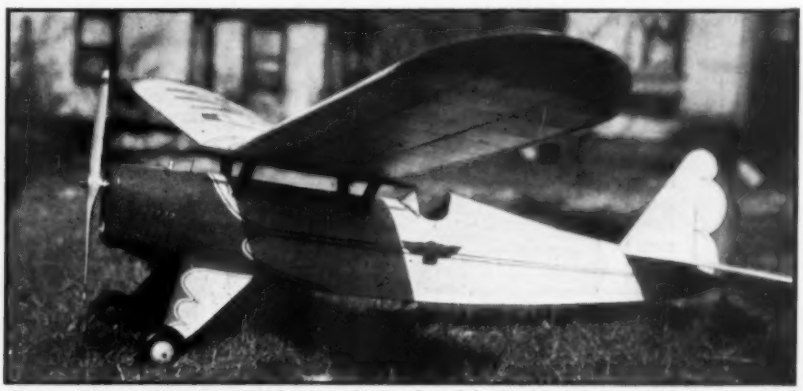
Picture No. 9—W. R. McNeil's gas model equipped with a single-bladed propeller which he says is very efficient



Picture No. 11—A close-up of the radio receiving set installed in Mr. Felix La Vallee's gas model. He says it operates very well

Picture No. 10—A ship of unusual design by Don McLead which he says "flew right off the drawing board"

Picture No. 7—A close-up of the 4 cycle motor installed in Reithmaier's plane



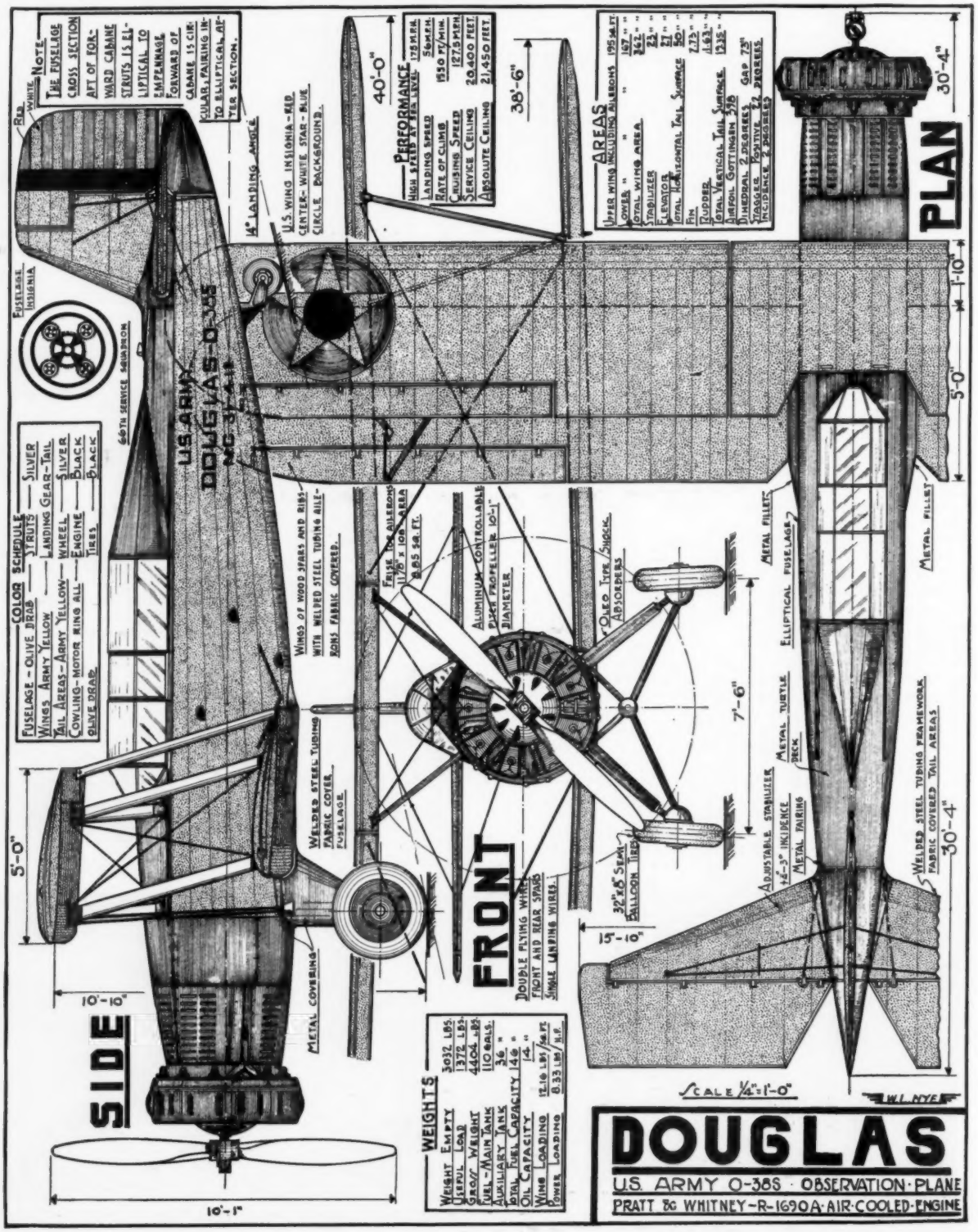
Picture No. 6—Lawrence Reithmaier designed and built this job in which he installed a four cycle engine made by his father. The model is of specially fine design

looking up the various phases of the work, striving to improve each job that they created to make it just a little bit better than the last one finished; drawing their own designs, going into every angle of the work, that they thought might give them more of an insight into just why these frail little crafts would fly better and give a more satisfactory performance.

"When these lads reached beyond the small building stage, they turned to the gas model field, as they thought there was more opportunity to develop talents along a line that would give more results; laying a foundation and future for the airplane men of tomorrow. No college could offer them more of an opportunity to study this particular industry than their steady and consistent work with the models.

"Many times the writer has been with these boys as they tested out their 'crates' as they sometimes call them, and never once have they flown them where there was

(Continued on page 55)



Radio Control

How Radio Control for Model Airplanes is Being Developed and a Description of One System That Gives Promise of Fine Results

By LEO A. WEISS

Weiss and Lopus tuning up their radio-controlled model

PICTURE this scene if you can. The place is Wayne County Airport, site of the 1937 National Contests, sponsored by the N.A.A. The time is Sunday, July 11, which is the last day of the outdoor competitions. Situated on a far corner of the field, slightly set apart from the Texaco and other gas model competitions are six rather large gasoline-propelled models. About each are clustered five or six model builders, some working on the models, some working on the motors, and the remainder devoting their attention to some queer-looking apparatus heretofore never seen at a national contest.

These models were the representation of the newest and most spectacular forward step taken by the model builders of America. No doubt each of us who has flown model airplanes, be they small or large, has at some time or other harbored the desire to control their flights by other means than inherent stability. Such control was of course out of the question until the gas model reached its present advanced stage of development.

During the past three years, developmental work advanced very slowly, the main retarding factor being the lack of a national contest which would give recognition to the first person to operate a radio-controlled model successfully.

The N.A.A. officials, quick to appreciate this fact, announced last year that they would establish a radio-controlled contest and this year, MODEL AIRPLANE NEWS was generous enough to donate a perpetual trophy for this event. With such concerted action on the part of the "high-er-ups," there was a period of feverish activity on the part of those model builders who could afford the expense necessarily entailed in the experimentation with radio control.

The results of this hurried work were the six models which appeared at Wayne County Airport on July 11. Not apparent at all to one looking at these models was the months of back-breaking labor and endless disappointments that had to be undergone by each of the builders.

As the meet progressed, it seemed probable that at least one of the models would fly successfully However, only Chester Lanzo, the winner, was able to fly his model, and it was apparent that his control system worked very erratically. Pat Sweeney cracked his large white model up on an attempted flight, and R. Wasman, of Jacksonville, Fla., demonstrated that he did have some control of the model on the ground, but to many observers, it seemed that his model (called the "White Mystery"—it was!!) had so many gadgets on it, including a wind-driven generator, that true control was virtually impossible.

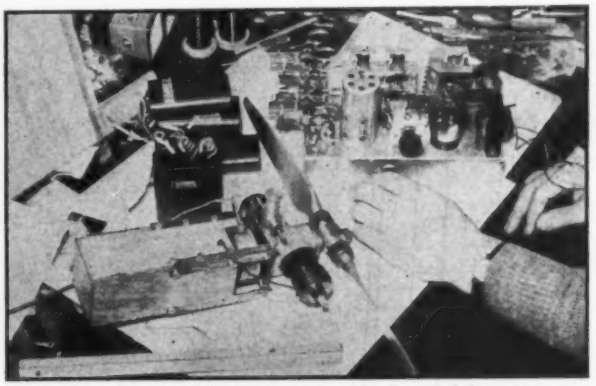
The author brought out his attempt at a radio-controlled model, although no attempt was made at either controlled or uncontrolled flight. Mr. John Lopus, who worked on the radio apparatus, and the author, were very disappointed to be able to do no better than exhibit our model and radio. We felt, as did many others, that we should be foolish to risk a crash with a half-completed model and radio.

(Continued on page 38)

R. Wasman's "White Mystery" was a unique piece of work with a wind-driven generator

Pat Sweeney's radio-controlled monster as it appeared at the "Nationals," Detroit, Mich.

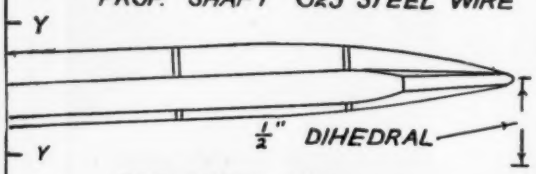
Weiss and Lopus in their "lab" working on the intricate details of their model plane radio equipment. Note the 2 cylinder ½ h.p. engine

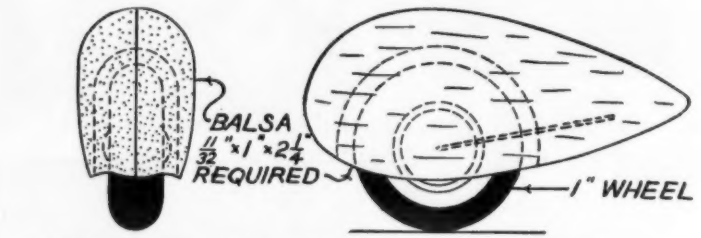


A close-up of some of the parts composing the receiving apparatus to be installed in their model plane

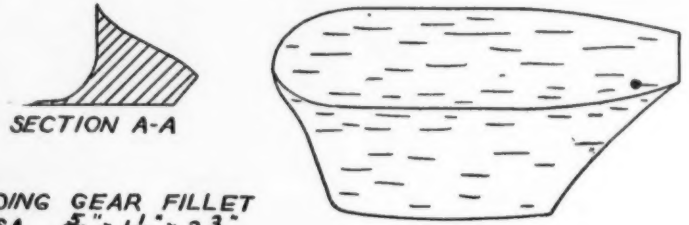
PLATE No. 5

PROP. SHAFT .025 STEEL WIRE

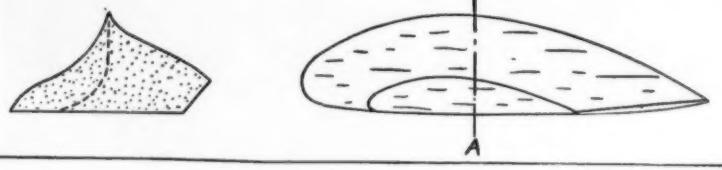


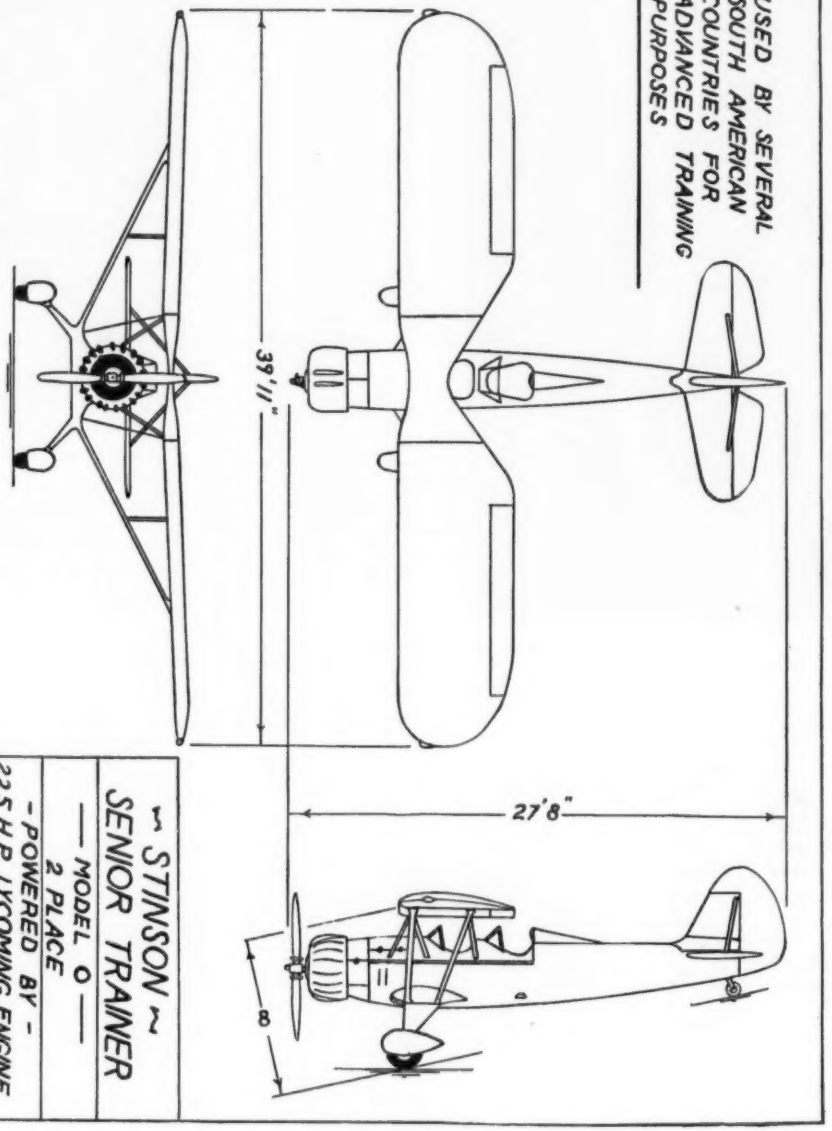


CONSTRUCTION DETAIL — WHEEL PANTS



LANDING GEAR FILLET
BALSA 5/8" x 1 1/4" x 2 3/8"





USED BY SEVERAL SOUTH AMERICAN COUNTRIES FOR ADVANCED TRAINING PURPOSES

~ STINSON ~
SENIOR TRAINER
— MODEL O —
2 PLACE
- POWERED BY -
225 H.P. LYCOMING ENGINE

Three "shots" of the model in actual flight that tell a convincing story of its performance

Build This Flying Stinson Trainer

A Very Stable and Reliable Performer That Will Give You Real Flying Joy When Built According to the Data Presented Here

By JESSE DAVIDSON and HARRY APPEL

THE Stinson Senior Trainer is in reality an open cockpit version of the famous 1935 Reliant. The ship is especially adopted as a two-seater military advanced trainer. Because of its low cost, economy of operation, and three purpose utility, several South American countries became the initial buyers of Stinson's first expressly designed military airplane.

The fact that this machine is particularly manufactured for export, very little information concerning its construction and performance figures have been made public. The following, however, may be made known. An entirely new fuselage was designed so that transformation into a two-seater fighter or a two-place observation ship from its basic purpose could be accomplished within a short time is one advantage. A standard Reliant wing but with a cutaway center section mounted on splayed struts is braced to the wing stubs as is on the Reliant. Due to the cutaway in the wing visibility is excellent at all times. As an armed machine the Senior whose official designation is Model O, may be equipped with twin machine-guns concealed under the cowl and firing between the revolutions of the propeller or one gun may be used in that position and another one mounted on a scarf ring over the rear cockpit. Bomb racks can also be installed below the wing stub in between the landing gear with the releasing mechanism in the pilot's cockpit.

In the place of armament and purely as an observation ship it can be fitted with camera and radio facilities. A 225 hp. Lycoming engine and a Smith controllable pitch propeller are standard equipment.

As a flying model the S. T. in one word is SWELL. It is a true prototype of the real ship. When the model was test flown for the first time it would climb exceedingly well although it covered no great distance and at the termination of its power and with considerable altitude it proved to be a fine glider with a "dead stick". After many such flights which became a bit exasperating after a while, it was adjusted for straight flying and that proved to be a revelation. Combined with speed and its ability to cover several hundred feet the model always glides beautifully to a neat three point landing with the gentleness of a falling snowflake—and that, you potential S. T. builders, means all landing gear washouts are dispensed with. The dimensions of the model are as follows. Wing span—20″, overall length—13″, wing chord—3¼″, height—5⅝″, tread—5″, prop dia.—7″, dihedral—½″, angle of incidence—2 degrees. Motor power—3 strands ⅛″ flat.

Fuselage Construction

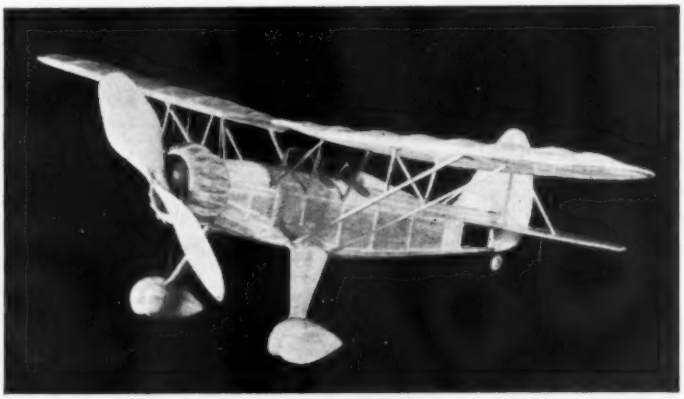
The first step in constructing the fuselage is to join perfectly plates 1 and 2 together by carefully removing them from this magazine and tacking them down on your working table or board. If your intentions are to use these plates again or to pass them on to someone else then it is best to preserve them by placing transparent paper over all the drawings. Build one side of the frame at the time. The longerons and the vertical and horizontal members are 1/16 sq. balsa. Hard strips are preferred. When the box-like form has been attained, proceed by cementing all the formers designated T-1 to T-7 inclusive along the top of the body. Formers letter B-1 to B-7 inclusive are cemented in their respective positions to the underside of the body while formers S-1 and 2 are cemented to the sides as shown on plate 1. The stringers which are 1/16″ sq. balsa are cemented in their proper notches and small model-making pins used to hold them in the curved shape until the cement has dried hard enough to allow for their removal

The cockpit sides are cut out of 1/64″ sheet balsa and cemented as shown. The windshield frames are constructed from bamboo strips of 1/32″ thickness and celluloid patterns fitted in them with the aid of a bit of cement in the corners. The streamlined headrest is partially hollowed out as shown and cemented over formers T-5 and 6. A small door cut from 1/16″ sheet balsa is shaped as shown and made to fit snugly in its frame. Two model-making pins, one inserted from above and the other from below serve as hinges. See plate 2 for details. The tail wheel and rear hook details are quite obvious. Cement each in position. The tail wheel should be made of hard balsa.

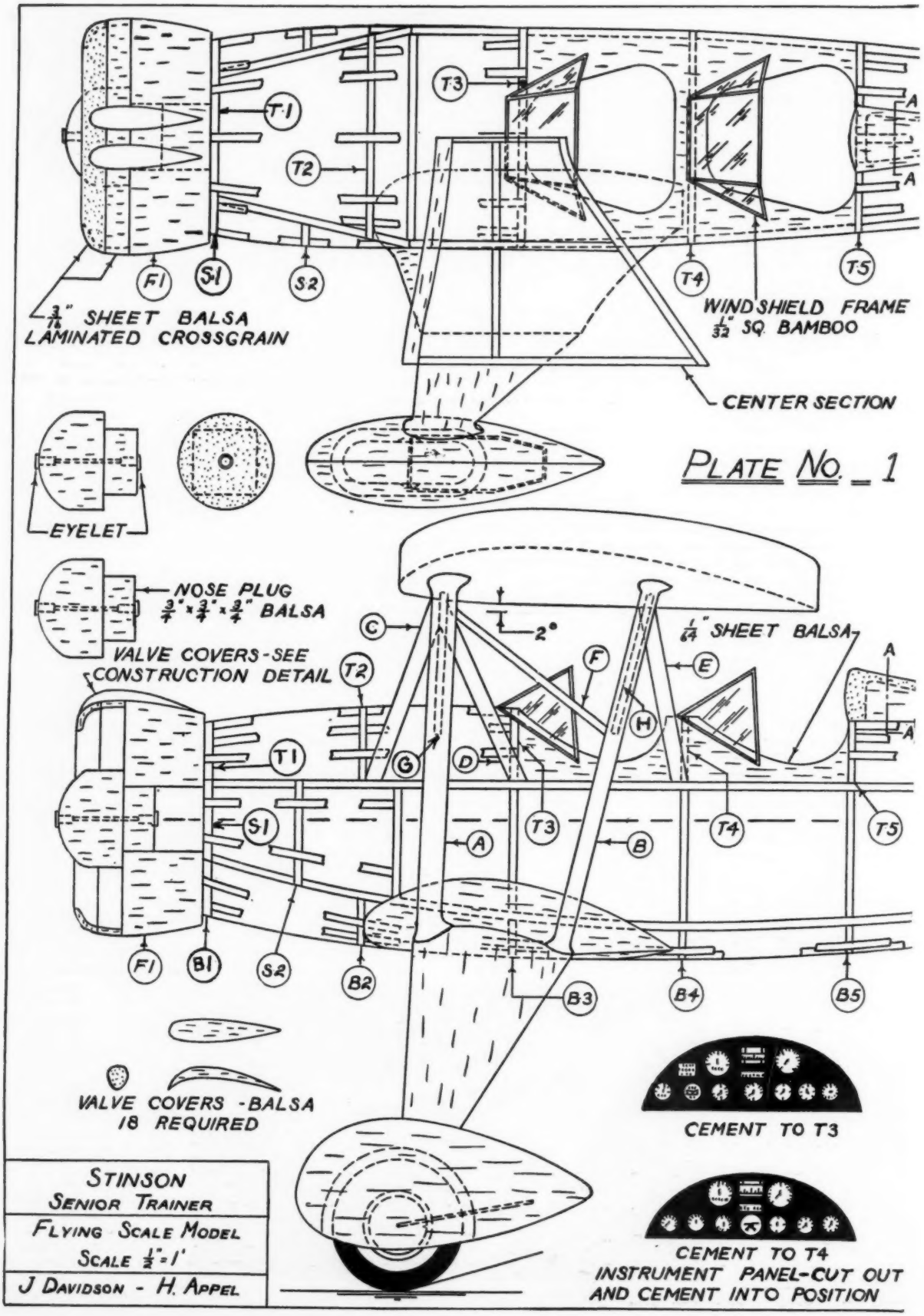
The motor cowling is constructed in three parts. F-1 is the largest part and its dimensions are given on plate 2. The space in the center accommodates the nose plug and is ½″ square. The two front parts of the motor cowl are cut to shape from 3/16″ sheet. When they are sanded to shape and space provided for the nose plug, they are then cemented cross-grained as shown. After the combination has dried hard, cement to the larger portion F-1. At this time the nose plug should be made, and an eyelet inserted in both front and rear as shown on plate 1. The next step is to cement all the valve covers into position. While their appearance isn't at all necessary and their weight negligible it still is best to attach them for accuracy's sake.

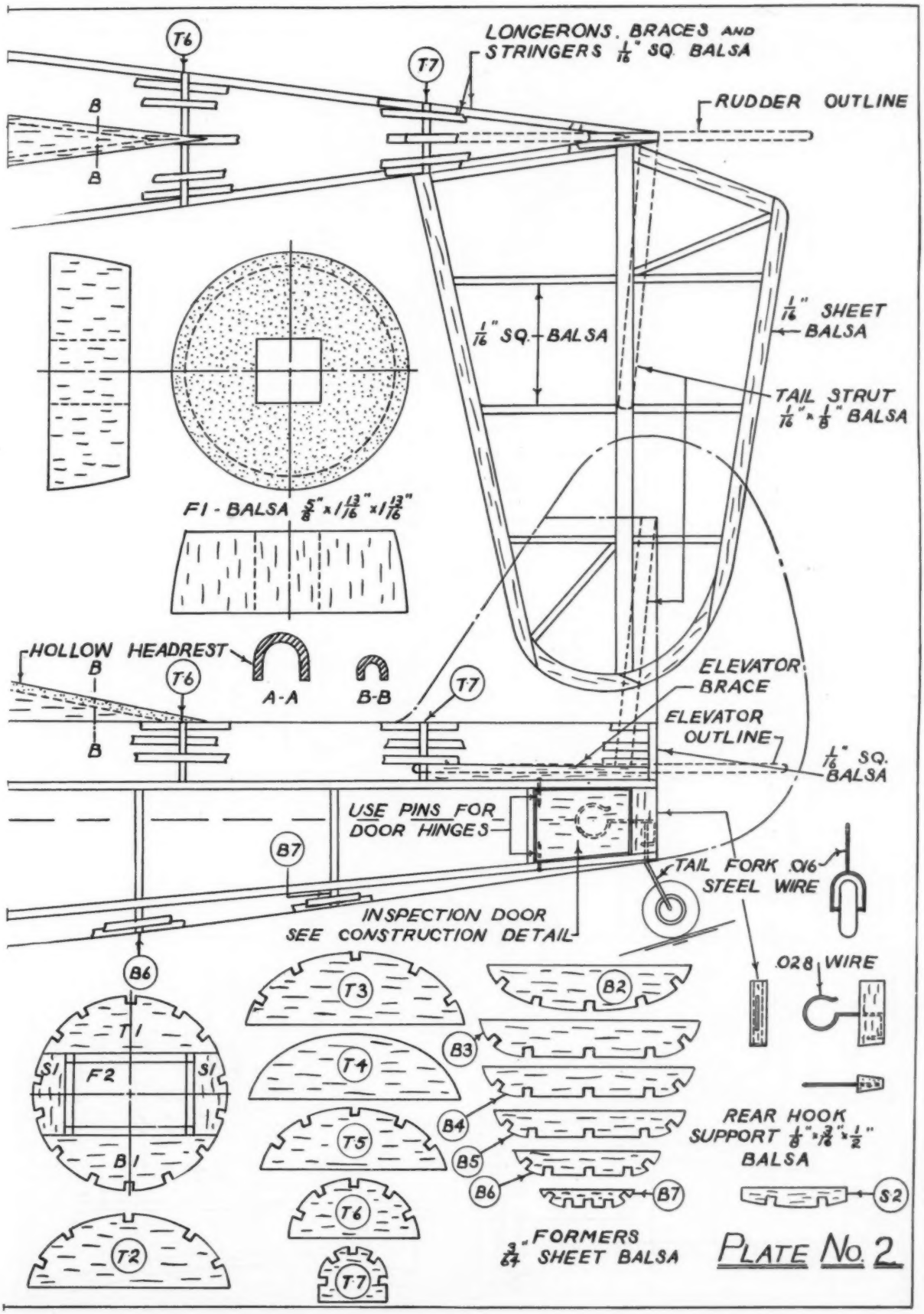
The next step towards completing this fine flying model is the constructing of the combination wing and landing gear stub. Drawings of it are placed on plates 1-4-5 with dimensions on plate 5. Use particularly hard balsa for this part. Make a careful study of its contours from all views and then work out a tracing onto the balsa. A sharp knife and rough and smooth grades of sandpa-

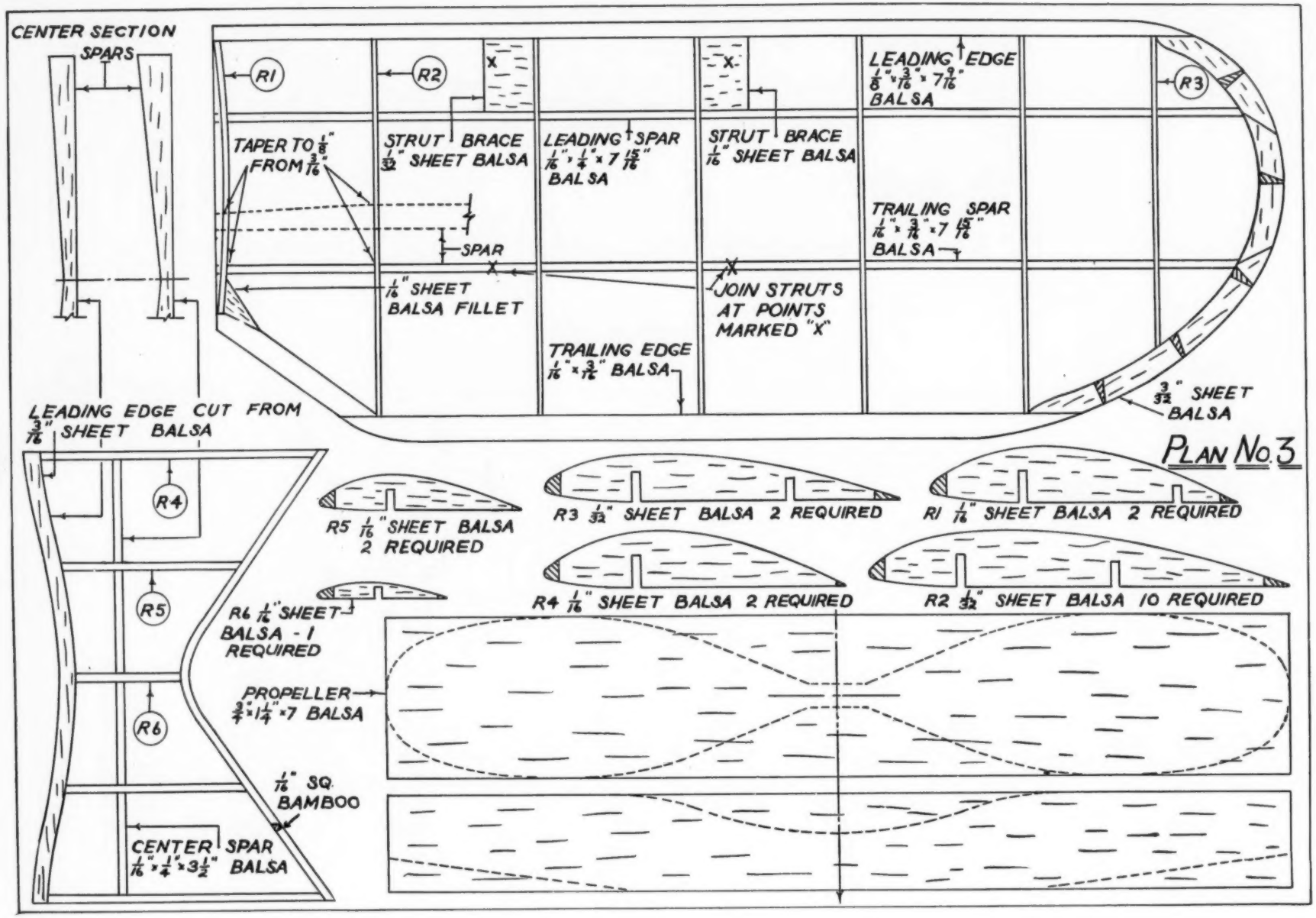
(Continued on page 52)

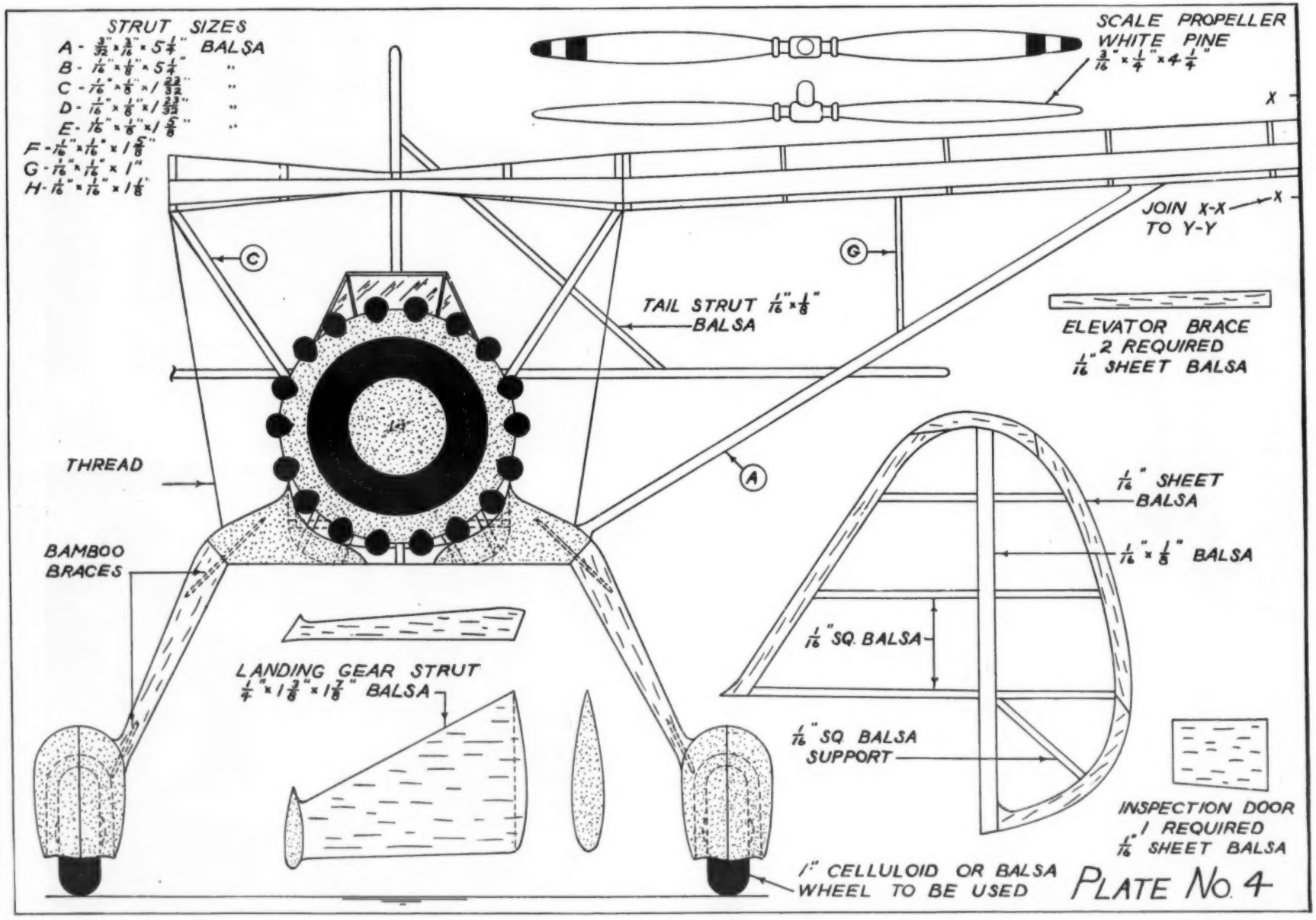


The little flier, complete and ready for action


T1
T2
T3
T4
T5
A
A
F1
S1
S2
3/16" SHEET BALSA LAMINATED CROSSGRAIN
WINDSHIELD FRAME 1/32" SQ. BAMBOO
CENTER SECTION
PLATE NO. 1
EYELET
NOSE PLUG 3/4" x 3/4" x 3/4" BALSA
VALVE COVERS - SEE CONSTRUCTION DETAIL
C
2°
1/64" SHEET BALSA
F
E
H
G
D
B
A
B1
B2
B3
B4
B5
VALVE COVERS - BALSA 18 REQUIRED
CEMENT TO T3
CEMENT TO T4
INSTRUMENT PANEL - CUT OUT AND CEMENT INTO POSITION
STINSON
SENIOR TRAINER
FLYING SCALE MODEL
SCALE 1/2" = 1'
J DAVIDSON - H. APPEL


T6
T7
LONGERONS, BRACES AND STRINGERS 1/16" SQ. BALSA
RUDDER OUTLINE
B
B
1/16" SQ. BALSA
1/16" SHEET BALSA
TAIL STRUT 1/16" x 1/8" BALSA
F1 - BALSA 5/8" x 13/16" x 13/16"
HOLLOW HEADREST
A-A
B-B
ELEVATOR BRACE
ELEVATOR OUTLINE
1/16" SQ. BALSA
USE PINS FOR DOOR HINGES
B7
TAIL FORK .016 STEEL WIRE
INSPECTION DOOR SEE CONSTRUCTION DETAIL
.028 WIRE
B6
T1
S1
F2
S1
B1
T3
T4
T5
T6
T7
T2
B2
B3
B4
B5
B6
B7
REAR HOOK SUPPORT 1/8" x 3/16" x 1/2" BALSA
S2
3/64" FORMERS SHEET BALSA
PLATE No. 2


CENTER SECTION
SPARS
R1
R2
X
X
LEADING EDGE
1/8" x 3/16" x 7 9/16"
BALSA
R3
TAPER TO 1/8"
FROM 3/16"
STRUT BRACE
1/32" SHEET BALSA
LEADING SPAR
1/16" x 1/4" x 7 15/16"
BALSA
STRUT BRACE
1/16" SHEET BALSA
TRAILING SPAR
1/16" x 3/16" x 7 15/16"
BALSA
SPAR
1/16" SHEET
BALSA FILLET
JOIN STRUTS
AT POINTS
MARKED "X"
TRAILING EDGE
1/16" x 3/16" BALSA
3/32" SHEET
BALSA
LEADING EDGE CUT FROM
3/16" SHEET BALSA
PLAN NO. 3
R4
R5
R6
R5 1/16" SHEET BALSA
2 REQUIRED
R3 1/32" SHEET BALSA 2 REQUIRED
R1 1/16" SHEET BALSA 2 REQUIRED
R4 1/16" SHEET BALSA 2 REQUIRED
R2 1/32" SHEET BALSA 10 REQUIRED
R6 1/16" SHEET
BALSA - 1
REQUIRED
PROPELLER
3/4" x 1 1/4" x 7 BALSA
1/16" SQ.
BAMBOO
CENTER SPAR
1/16" x 1/4" x 3 1/2" BALSA


STRUT SIZES
A - 3/32" x 3/16" x 5 1/4" BALSA
B - 1/16" x 1/8" x 5 1/4" ..
C - 1/16" x 1/8" x 1 23/32" ..
D - 1/16" x 1/8" x 1 23/32" ..
E - 1/16" x 1/8" x 1 5/8" ..
F - 1/16" x 1/16" x 1 5/8"
G - 1/16" x 1/16" x 1"
H - 1/16" x 1/16" x 1 1/8"
SCALE PROPELLER
WHITE PINE
3/16" x 1/4" x 4 1/4"
X
JOIN X-X TO Y-Y
TAIL STRUT 1/16" x 1/8" BALSA
ELEVATOR BRACE
2 REQUIRED
1/16" SHEET BALSA
THREAD
BAMBOO BRACES
1/16" SHEET BALSA
1/16" x 1/8" BALSA
1/16" SQ. BALSA
1/16" SQ. BALSA SUPPORT
LANDING GEAR STRUT
1/4" x 1 3/8" x 1 7/8" BALSA
INSPECTION DOOR
1 REQUIRED
1/16" SHEET BALSA
1" CELLULOID OR BALSA WHEEL TO BE USED
PLATE No. 4

National Aeronautic Association Junior Membership News

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

A NUMBER of protests have been filed with the national headquarters of the NAA relative to the restriction of gas model events in a number of communities. The National Aeronautic Association, in line with its policy of encouraging every phase of aeronautical development, is ready and willing to champion the cause of any group whose activities seem to be unduly restricted. If your local club's activities are being interfered with unjustly in your opinion, we will welcome the opportunity to assist you.

There are, of course, a number of airports which either because of limited space or dense traffic cannot be used safely for any kind of model activity. On the other hand there are hundreds of airports which are idle for many hours during the week and on which properly coordinated model activities can be conducted with the utmost safety. Where congestion at the local airport makes the conduct of model activity unwise, the national headquarters of the NAA as well as its organized local group and individual members will be glad to be of service to model groups in arranging for the use of special areas where models can be flown without any damage to the public at large or to the participants.

One of the most distressing rulings of recent date is that made by Registrar Frank A. Goodwin of Massachusetts. According to press releases, he has ruled that gas powered models are legally aircraft and cannot be flown in the state of Massachusetts unless licensed and operated by licensed pilots. It will be interesting to see where Mr. Goodwin will draw the line. If any heavier than air contraptions

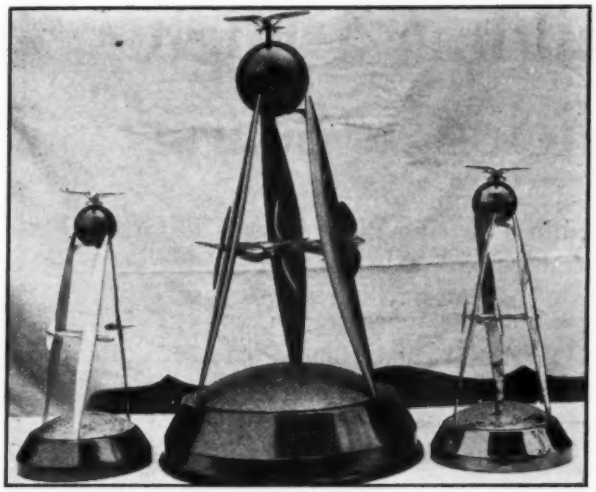
The Mulvihill and the Texaco trophies. (Courtesy Berry Bros.)

One of the older fans starting his four cycle engine. (Chicago)

A group at the gas contest held by Chicago builders

Mr. Wm. Enyart, Chairman of Contest Board, N.A.A., examines the only known steam-driven model in the U. S. (Berry Bros.)

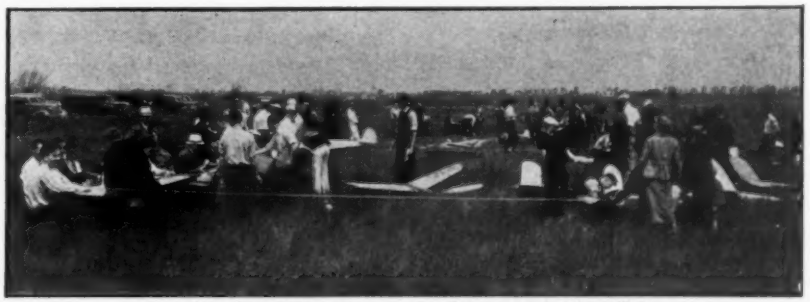
Mr. A. D. Althouse, Mr. George Tabraham and Mr. Chas. H. Grant check the winning scale model. (Courtesy Berry Bros.)



The Richard C. du Pont trophies. They are of most unusual design. (Courtesy of Berry Bros.)

The Berryloid trophies for the best finished gas models and best finished scale models and the Jefferson Beach trophy

Alvie Dague, who won more awards than anyone else. (Courtesy Berry Bros.)



An action view of the recent gas model contest held in Chicago

Wallace Simmers of Chicago, winner of the Stout trophy. (Courtesy Berry Bros.)

which can be made to fly must be flown in accordance with such a ruling then the youngsters of Massachusetts will have to throw away their toy paper gliders. These are just as certainly aircraft, and of course youngsters under sixteen years of age are not eligible for pilots' licenses. This looks like a very unfair interpretation of the law which was drafted to provide for the regulation of man-carrying aircraft. It is to be hoped that aviation enthusiasts in the state of Massachusetts will be successful in insisting upon a liberalization of this ruling.

NAA Sanctioned Contests for August and September

The Lehigh County Education & Recreation Program will hold a gasoline-powered model meet on August first at the Allentown-Bethlehem Airport under the direction of Mr. W. N. J. Wiend and Mr. William S. Berry, Contest Director.

Jordan Marsh-Boston Traveler Junior Aviation League will hold a Model con-

(Continued on page 54)

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Building a High Efficiency Soarer

How You Can Build a Soaring Plane That Will Give a Performance Comparable With Power-Driven Models—A Real Contest Winner

By PAUL ZAKIM and HENRY CLARK

Paul Zakim and the five foot soaring plane described in this article

HOW many times have you taken it into consideration to build a soarer as a diversion from your regular routine of building? Have you found it difficult to build one that performs as well as its larger brothers, yet is as simple to construct as any commercial you've yet built? Here is one that is easy to build and is an excellent performer. At present the N.A.A. record for Class "D" tow-line soarers is only two minutes and some odd seconds. The model described here is a serious threat to the present record, and although the model was never officially timed by an N.A.A. timer, it has surpassed the present record many times.

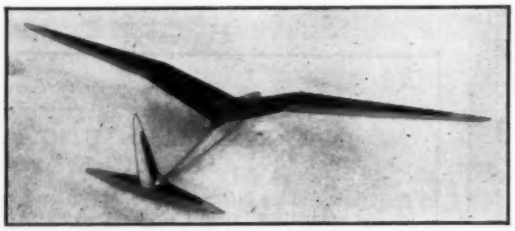
Before beginning construction it is advisable that the plans be studied and understood thoroughly. This will allow you to work more smoothly and precisely. Use care in making all your cement joints, and above all, don't rush! Take your time! Any plane that is to be a potential prize winner, must be constructed with the utmost care and accuracy.

Fuselage

Before beginning the fuselage it is advisable to draw a full size outline of the body, also draw up the cross section full size. Next cut out the cross section templates from either stiff cardboard or metal. Obtain a block of medium hard balsa, 1½ x 3 x 19 inches, making sure that it is straight grained, and free from worm holes and knots. Use the best quality wood you can obtain. Now trace the side view of the body on the block, and with a scroll saw, cut jut outside the line. Do not cut out the section in which the wing is to be mounted. This must be cut out last. Next trace the top view and repeat the operation. When this is completed, trim the fuselage outline to the pencil marks by sanding, thereby removing all saw marks. With a very sharp knife, start rounding the fuselage off. Do not try to make the cross section of the fuselage fit the templates as after sanding it will be undersized. Instead, cut it a trifle oversized. Using No. 0 sandpaper, sand the fuselage clean, taking off all knife marks and bumps, constantly checking the contour of the section with each template. Use No. 00 or less to finish off the job. Next give the body three coats of banana oil, sanding lightly between coats. To obtain a high gloss use Johnson's floor wax, following the directions given on the can. Do not be afraid to rub in well. Two coats will suffice. Now, very carefully cut out the grooved section where the wing fits, parallel to the line of flight. Do not try to incorporate any incidence in the groove itself, that will be taken up in the same chapter with the wing instruction. Now cut out weight compartment as illustrated on the plan. When this is finished, cut the slot for the stabilizer.

Tail Surfaces

Use medium hard balsa throughout the entire tail. The main spar is $\frac{1}{16}$ x $\frac{1}{16}$ x 16 inches at the root and $\frac{1}{16}$ x 1/32 at the tips. The leading edge is $\frac{1}{16}$ sq. at the root, tapering to 1/32 sq. at the tips. The trailing edge is $\frac{1}{16}$ x $\frac{1}{16}$ and at the tip it is 1/32 x $\frac{1}{16}$. Lay out the stabilizer on a flat board, using pins to keep the spars in place. Next cut out the ribs from 1/32 speckled sheet balsa. Notice the inverted camber in the tail, this is very important. The tips are 1/32 sheet balsa. Cover the center section with 1/64 sheet as shown on plan. Make sure that everything is dry before sanding preparatory to covering. The rudder is constructed in the same manner as the stabilizer, except that the rib is a streamline form. Be careful not to allow the rudder or stabilizer to warp out of shape, as this will have disastrous effects upon the flight of the ship.



The completed soarer has a bird-like appearance and provides real thrills when in flight

Wing

For the wing, make the main spars first. These are to be made from very hard balsa 1/64 x ¾ inch. Measuring off thirty inches on each strip you will have the full length for one half the wing. This must be tapered to $\frac{1}{16}$ sq. The spar of the root section must be cut off at the angle noted on the plan, and also at a point ten inches from the root of the spar another angle is cut, as designated. These angles if cut right, will give the proper dihedral to the wing, for both sections. It is advisable that a full size view of the entire wing be drawn up on tracing paper. The form for the left wing will be obtained by merely turning the paper over to the other side. Wax paper may be used to prevent the fram from sticking to the plan you've drawn.

Build the two root sections first using the utmost care in the cement joints and placing of the ribs. The ribs will have to be cut out one at a time, and shaped separately to each one's own size. Each rib after being formed, will be cut in two where the spar passes through them, then they are placed into positions in two halves, front and rear half. The front section of each may be left squared off until the leading edge has been placed and cemented, then rounded off when the wing is completely dried. The framework is then removed from the plan. Bear in mind that each section is to be assembled on the plan, separately from the others.

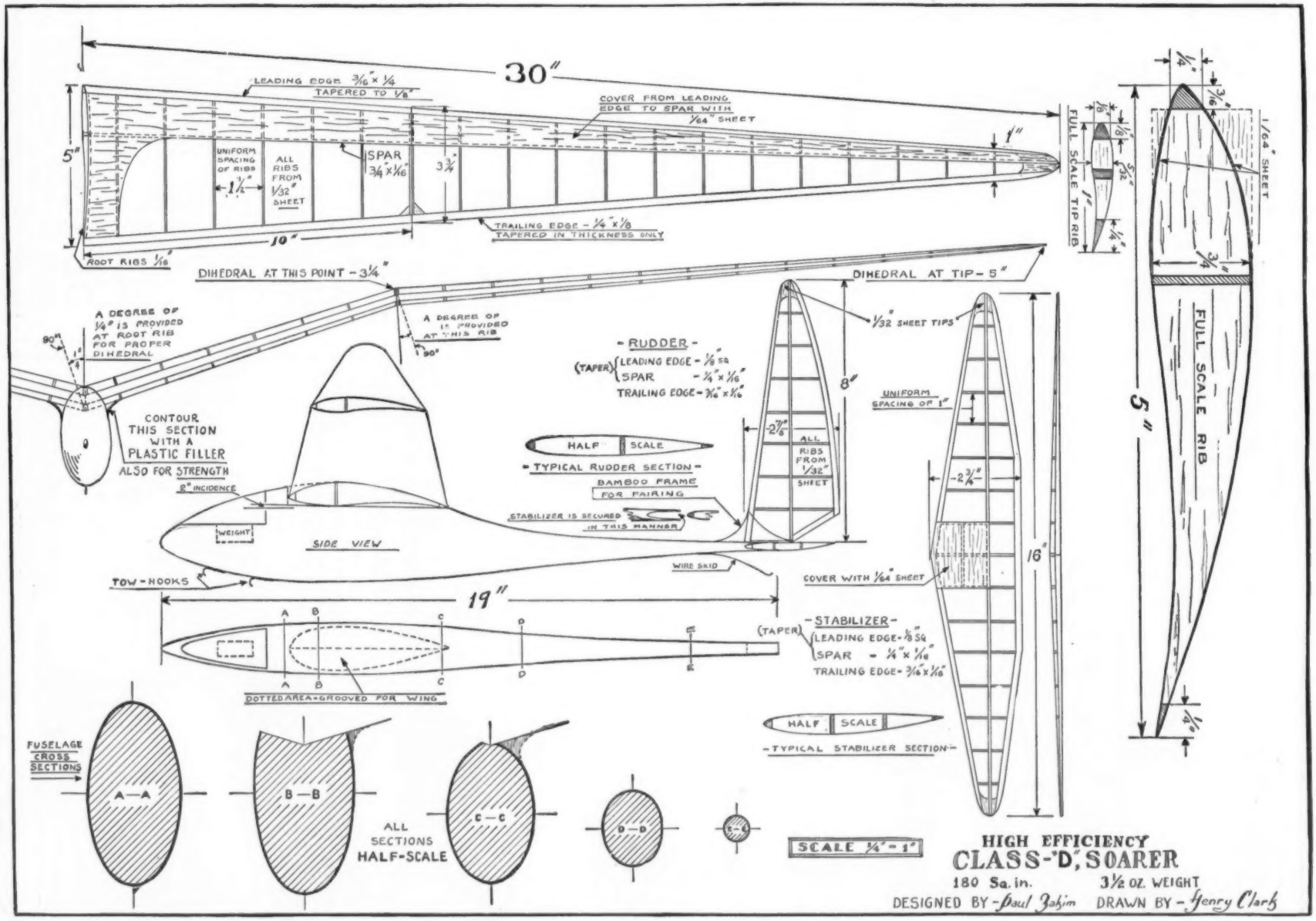
The 1/64 sheet is then applied and cemented to the leading edge, and bent back to meet the top of the spar where it is again cemented, and pinned till dry. The same process is repeated for the bottom of the wing. This type of construction affords a great deal of strength inasmuch as it forms a box spar. At the root rib this covering extends back to the trailing edge as shown and affords a surface for the plastic filler to grip.

Take your time on the wing and tail and produce efficiency and not carelessness.

Covering and Assembling

The covering of the wing and tail surface, is done in the conventional manner and a good grade of superfine tissue is used throughout. Cover the four sections of the wing separately and assemble them

(Continued on page 48)


30"
LEADING EDGE 3/16" x 1/4" TAPERED TO 1/8"
COVER FROM LEADING EDGE TO SPAR WITH 1/64" SHEET
5"
UNIFORM SPACING OF RIBS 1 1/2"
ALL RIBS FROM 1/32" SHEET
SPAR 3/4" x 1/16"
3 3/4"
1"
TRAILING EDGE - 1/4" x 1/8" TAPERED IN THICKNESS ONLY
10"
ROOT RIBS 1/16"
DIHEDRAL AT THIS POINT - 3 1/4"
DIHEDRAL AT TIP - 5"
A DEGREE OF 1/4" IS PROVIDED AT ROOT RIB FOR PROPER DIHEDRAL
90°
1 1/4"
A DEGREE OF 1" IS PROVIDED AT THIS RIB
90°
CONTOUR THIS SECTION WITH A PLASTIC FILLER ALSO FOR STRENGTH
2° INCIDENCE
WEIGHT
SIDE VIEW
- RUDDER -
(TAPER) LEADING EDGE - 1/8" SQ
SPAR - 1/4" x 1/16"
TRAILING EDGE - 3/16" x 1/16"
HALF SCALE
- TYPICAL RUDDER SECTION -
BAMBOO FRAME FOR FAIRING
STABILIZER IS SECURED IN THIS MANNER
1/32" SHEET TIPS
8"
2 7/8"
ALL RIBS FROM 1/32" SHEET
UNIFORM SPACING OF 1"
2 3/4"
16"
COVER WITH 1/64" SHEET
WIRE SKID
TOW-HOOKS
19"
A B C D E
DOTTED AREA = GROOVED FOR WING
- STABILIZER -
(TAPER) LEADING EDGE - 1/8" SQ
SPAR - 1/4" x 1/16"
TRAILING EDGE - 3/16" x 1/16"
HALF SCALE
- TYPICAL STABILIZER SECTION -
1/4"
3/16"
1/64" SHEET
1/8"
FULL SCALE TIP RIB
5/32"
1"
1/4"
3/4"
FULL SCALE RIB
5"
1/4"
FUSELAGE CROSS SECTIONS
A—A
B—B
C—C
D—D
E—E
ALL SECTIONS HALF-SCALE
SCALE 1/4" - 1"
HIGH EFFICIENCY
CLASS-'D' SOARER
180 Sq. in.
3 1/2 OZ. WEIGHT
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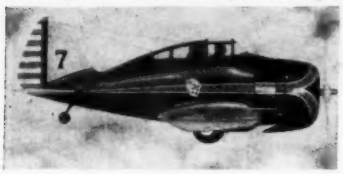

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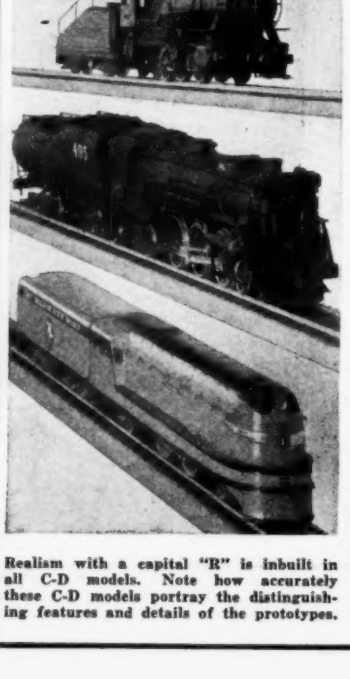

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The C-D M

From away up in Ottawa, Canada, R. G. S. writes a

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Thank you, R. G. S. We make every effort to give the sible. We know how anxious a modelbuilder is to R-U-S-H. However, of late, due to our moving, our s off stride. To any customers who have been i apologize—but now with our new larger shi modern methods, we're going to out-do Merc hope—do hope!

J. K. of Paterson, N. J., tells us:

"it is very seldom that I stop to write to praise of their products but in this case I m have built several of your C-D "Dwarf" Kit "Swift," Great Lakes Sport Trainer and D scale I have built the Lincoln Sport Plane Plane. Right now I have started on your new C and think you have a great idea. Sometime a for new models and was I surprised to see some the market bearing the C-D stamp and right t company who takes in suggestions from all over a pretty darn good company. Whenever anyone other companies' planes are I, with gusto refer think I have converted some 18 boys to the new

That's a dandy letter, J. K., and we certainly up to the good things you say about us.

From P. S. E. of Detroit comes this nice letter

"I purchased your Hawk Dwarf kit a year a you on the perfect embodiment of details in th seen such neatness of design and accuracy i Hawk."

Thanks, P. S. E. We're constantly striving to Ben Bernie, the mostest of the bestest.

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"I just want to drop you a line and compli bought one of your dollar kits to see how they a modelbuilding. I have never seen such complete plans. One could never go wrong building your from now to the end of my model days."

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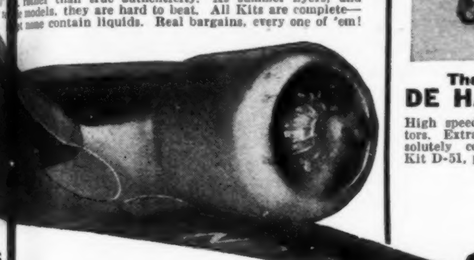

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Both models really look beautiful even before the covering is applied. The wonderful appearance of the really strong built-up ribs (all very simply made in a very few hours) add much of this appearance, and due to the brand new C-D Principle, shock absorbing landing gear details, adjustable wing struts, removable wings, removable power unit, the movable control surfaces, etc., necessitating the inclusion of many more materials and supplies than the average "gas model kit" contains.

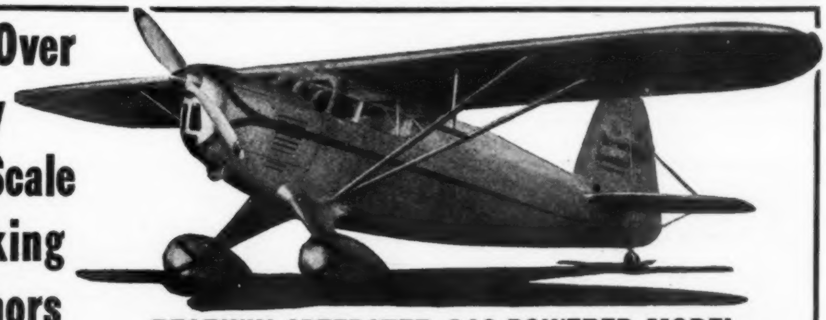
The kits contain all necessary strips and sheets, balsa wood, pine or bass and aircraft specification plywood, etc., necessary curved parts printed out on finest quality balsa, all necessary solid blocks required, all necessary tough "bamboo" tissue covering, thick celluloid for windshields and cabin windows, heavy music wire (not weak spring wire usually supplied), all necessary aluminum and brass sheets, screws, brads, small diameter special wire, etc., etc. Both models contain exceptionally large and thoroughly engineered, full size, well detailed C-D drawings, approximately 20 square feet or more each, authentic in true C-D fashion.

The Stinson, however, includes a well turned cowl front, and fuselage front the balance of the cowl being easy to make, the same as are all C-D's, and on the Rearwin, besides the solid nose block, a shaped leading edge is supplied.

Use any ½" or ⅞" Bore Motor

Both are suitable for any motors of ¾" to ⅞" bore (Cleveland Tom Thumb, Baby Cyclone, Brown Jr., Mighty Midget, Gwin and others). The best performance may be expected with motors of the largest size.

These kits are sold without the power unit, as is standard practice; we have also eliminated supplying wheels (and wheel shoes where designs require) to enable the model builder to select whatever wheels suit his fancy; and because many do not like wheel shoes on gas models. These may be purchased separately, if desired. For instance, for these models we have developed 3½" balsa wheels with bronze bearings at only 65c per pair. Wheel shoes to suit either model also available. Per set, with four routed out cavities, drilled to fit up to 3½" wheels, only 95c. Of course M & M, or any other type wheels may also be employed (3¼" size, $1.50; 3½" size, $3.50). Larger wheels may also be employed if wheel shoes are not used. These, like All C-D kits, are dry—there are no liquids (cements or dopes) supplied, but if you do not have any liquids on hand when purchasing either of the models, we recommend buying at least ½ pint of the balsa wood cement (55c, plus 15c packing charge) to start. Thus you have your own choice of any colors in the dopes you require and especially on quantity you may buy as little or as much as you like.

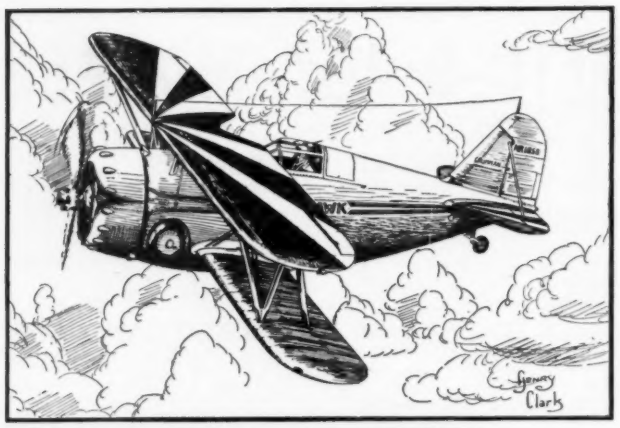


REARWIN SPEEDSTER GAS-POWERED MODEL

Model recommended to be colored all silver with brilliant red striping and black lettering. Span 64½". Complete plans and details $1.50, deductible from complete kit purchase price (less plans) if purchased within 10 days. Order dry kit GP-69, postfree anywhere, only............ $4.85

STINSON RELIANT GAS-POWERED MODEL

We suggest coloring to be all silver with blue trimmings, black lettering. Span 82". Complete plans and details $2.25, deductible from complete kit purchase price (less plans) if purchased within 10 days. Order dry kit GP-60, postfree anywhere, only............ $8.50



A sketch of Al Williams' Grumman G.G-2 by Henry Clark

AIR WAYS

HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Tell Others What You Are Doing

Results of the Air Ways Design Contest No. 3

Picture No. 1—A six inch solid scale Boeing P-12E by J. Bloom. Fine work for a small model!

Picture No. 2—Model or a large plane? Can you tell? We can't. A Chinese military Waco by Ken Darlin

THE biggest news this month of Air Ways Club activity is the winning of the Air Ways trophy by James Cahill of 1419 North Gale Street, Indianapolis, Indiana. This trophy is awarded to him for making the best time of any Air Ways Club member with a rubber-driven outdoor model at the National competition. Cahill placed first in the Moffett International Event with a time of 15 minutes, 45-1/10 seconds. For this he won the four awards given at the meet.

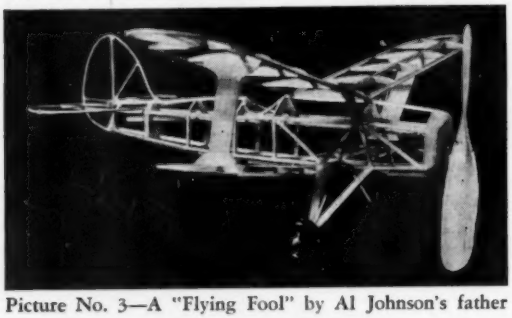
Now, any Air Ways Club member may compete for this trophy. It is required that he make a greater duration than 15 minutes, 45-1/10 seconds at any contest sanctioned by the National Aeronautic Association. This trophy will be passed on to an Air Ways Club member who betters this time under these conditions.

We have promised Air Ways Club members that the plans of the winning model will be published in MODEL AIRPLANE NEWS. We are hoping now that Mr. Cahill will not "let down" the other members of the Air Ways Club and will present his plans for publication so that all club members may derive benefit from building this fine ship.

Any Air Ways Club member who betters this time under the required conditions should communicate with the Air Ways Club, % MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City, immediately. However, in order that a club member shall receive the trophy, it is required that he submit his plans for publication to MODEL AIRPLANE NEWS.

The next item which is of great interest to Air Ways Club members is the announcement that Blaine Stevens of 921 Bates Street, Grand Rapids, Michigan, wins the Air Ways Club Design Contest No. 3. It was required that members entering this contest submit complete drawings for a speed model. The model was to be judged on its design characteristics, character of the construction of the model, the manner in which the plans were laid out on the page in respect to their clarity of meaning and the neatness of the drawing. For this accomplishment Mr. Stevens is awarded $20. The plans for his ship appear at the bottom of next page.

The little ship is very unique in design. The construction is not sim-



Picture No. 3—A "Flying Fool" by Al Johnson's father

Picture No. 4—K. P. Khoo and his twin hydro in far off Malaya

Picture No. 9—Contestants who took part in a successful contest held at Anderson, Ind.

Picture No. 5—Members of the model club of the Philippine School of Arts and Trades, Manila. They are all experts

Picture No. 6—Model builders of Denmark who do not let the wintry weather stop them. This picture was taken at one of their contests

ilar to other models inasmuch as the tube holding the motor forms the upper part of the fuselage. To the underside of this a streamline belly is attached which gives the ship a gracefully streamlined contour. Also it insures an extremely light construction. This is the most unique design that has been received. Details of the construction are cleverly presented in isometric views. The general aerodynamic design of the ship is excellent. It gives little resistance and, what is important, it is able to resist the high torque characteristic of the speed model because it uses a straight instead of a tapered wing. For any given span a high wing affords more resistance to torque than a tapered one. At the same time tip resistance is reduced to a minimum by the tips being gracefully curved. The character of the construction assures an extremely light ship.

In the event of a hard landing there is a slot which allows plenty of forward motion of the wing so that the landing jolt will not cause the wing to break loose or damage the fuselage. At the rear the motor is anchored well to the tube in which it is enclosed.

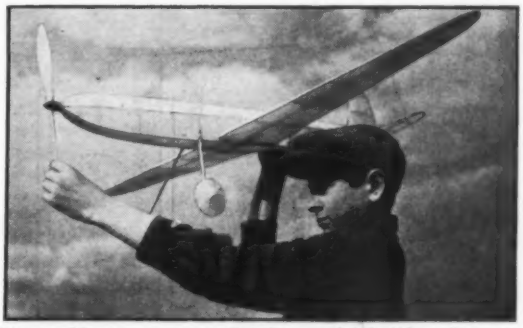
The winner of second place is William Elliott of 5671 Lake Drive, East St. Louis, Illinois. He placed high because of excellent design, logical construction and a very neat drawing. He was awarded $12 for this entry.

Third place, an award of $7, was won by Richard Dietz of 721 Walton Avenue, New York City. One of the unusual features of Dietz's model was the motor tube. The stresses of the motor were taken by this rather than by the outside shell of the fuselage. Because of this the fuselage may be made thin and light. His drawing was exceedingly neat.

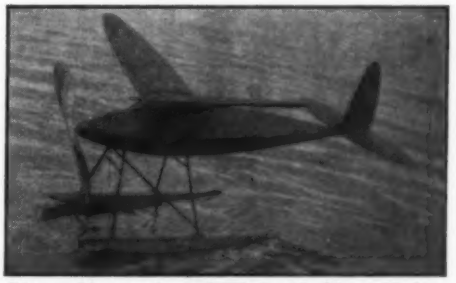
Fourth place and an award of $3 went to S. Bernstein of 4300 St. Urban Street, Apt. 2, Montreal, Canada. Bernstein placed because of the unique features of construction and a very clear system of showing the construction details. In other words, it was so presented that the machine could be built with comparative ease by the average model builder.

Fifth through tenth places, with an

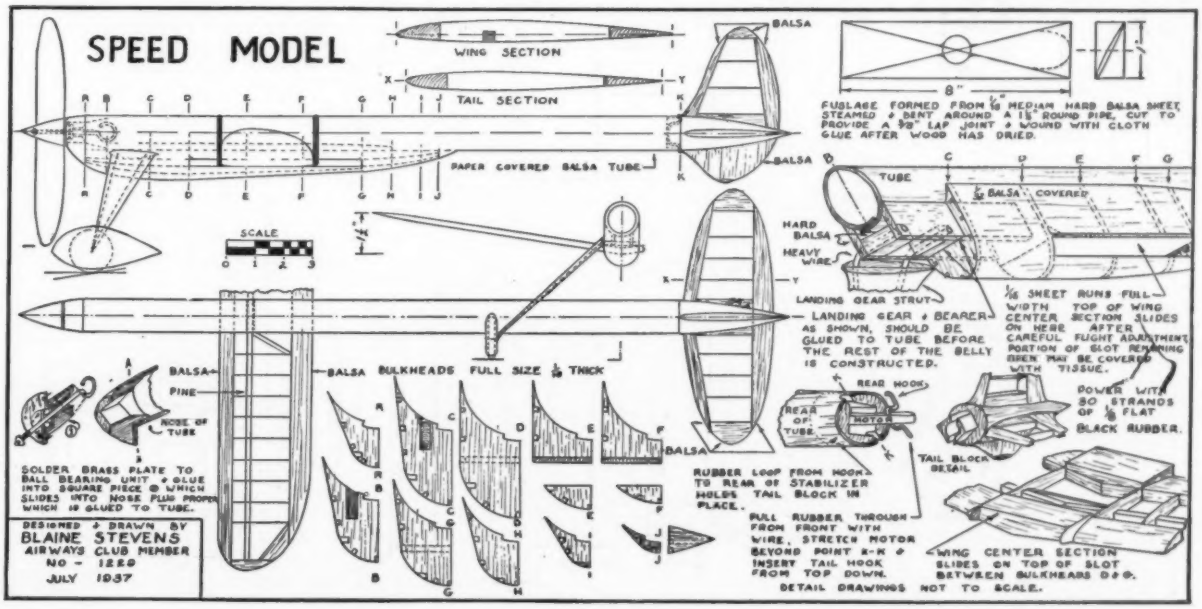
(Continued on page 60)

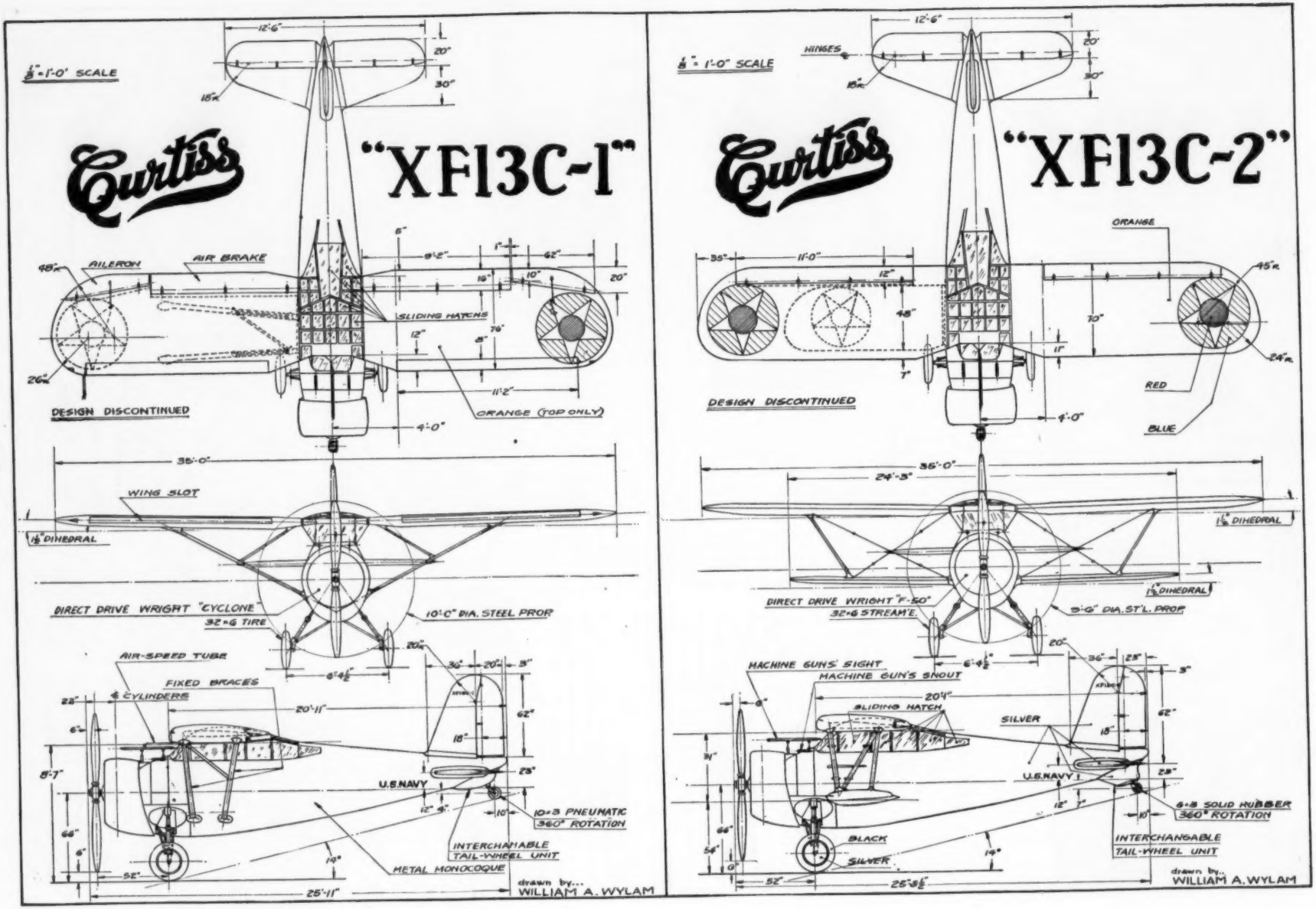


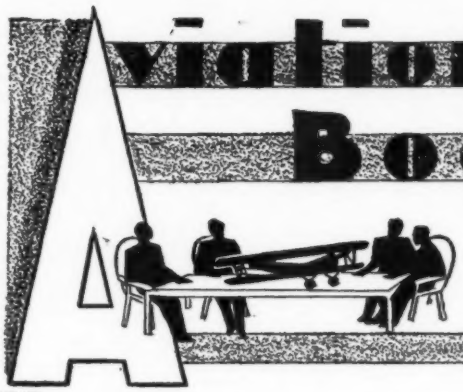
Picture No. 8—A young Russian model builder about to launch his model. It appears that he prefers "low-wings"



Picture No. 7—One of W. B. Mackley's Hydros




Curtiss
"XF13C-1"
3/8" = 1'-0" SCALE
AILERON
AIR BRAKE
SLIDING HATCHS
ORANGE (TOP ONLY)
DESIGN DISCONTINUED
WING SLOT
1/2° DIHEDRAL
DIRECT DRIVE WRIGHT "CYCLONE"
32"×6 TIRE
10'-0" DIA. STEEL PROP
AIR-SPEED TUBE
FIXED BRACES
4 CYLINDERS
U.S.NAVY
10×3 PNEUMATIC
360° ROTATION
INTERCHANGABLE
TAIL-WHEEL UNIT
METAL MONOCOQUE
drawn by...
WILLIAM A. WYLAM
Curtiss
"XF13C-2"
3/8" = 1'-0" SCALE
HINGES
ORANGE
RED
BLUE
DESIGN DISCONTINUED
1 1/2° DIHEDRAL
DIRECT DRIVE WRIGHT "F-50"
32"×6 STREAM'E.
9'-0" DIA. ST'L. PROP
MACHINE GUNS' SIGHT
MACHINE GUN'S SNOUT
SLIDING HATCH
SILVER
U.S.NAVY
6×3 SOLID RUBBER
360° ROTATION
INTERCHANGABLE
TAIL-WHEEL UNIT
BLACK
SILVER
drawn by...
WILLIAM A. WYLAM



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

HERE are a few questions which are troubling model builders in various parts of the model building world. Pete Kloga, Jr., of 229 South Paul Street, Springfield, Illinois, wants to know how to correct the following trouble:

Question: My stick model will fly properly if the wing is moved back but will have a very steep glide and if adjusted to glide well it will stall under power. What causes the trouble and how can I remedy it?

Answer: This is a condition which exists when there is too much longitudinal dihedral. That is, there is too much difference in angle between the wing and the stabilizer. The greater the amount of power used the less the difference in angle must be. Also the higher the wing is located above the thrust line the less the angle should be. On an ordinary high-wing plane the tail plane or stabilizer should be an angle approximately two to three degrees less than the wing. If the wing has an angle of three degrees incidence the stabilizer should be at zero. On parasol models where the wing is considerably above the thrust line, the difference in angles between the wing and the stabilizer should be from one to two degrees. In cases where the stabilizer is close to the wing or, as we say, "the airplane is close hauled," this angle should be correspondingly small. In such cases the angle should be reduced one degree over normal conditions where the tail moment arm is half the wing span. We suggest, in your case, that you make the stabilizer more positive than it is at present.

Question: Would it be better for an endurance stick model to have the wing farther back with more incidence on the wing, or move it forward with less angle of incidence?

Answer: Move it forward with less angle of incidence. We suggest an angle of incidence of about two degrees, if it is a parasol type with one degree positive on the stabilizer. Use three degrees if the wing is approximately on the line of thrust. In this case the stabilizer should be one degree positive to the line of thrust also.

Question: What features should a prop have to decrease torque?

Answer: Torque cannot be decreased by attributing to the propeller any particular quality without reference to its relationship to the plane. Usually the propeller produces excessive torque when its blades are acting at an angle of attack which is too large. In other words, at the angle at which they are acting they produce a large amount of drag relative to the amount of thrust delivered. This is caused by the model having too great a drag for the amount of blade area used on the propeller. The way to correct this trouble is to increase the blade area of your propeller or decrease the pitch or angle of the blades. In such cases it is usually not wise to change the pitch, but rather increase the area of the blades. If this cannot be done with the propeller now being used make a new one.

Question: For a stick model endurance plane, which would be better to use; a propeller of 9 inches diameter and 12½ inches pitch, or 7 inches diameter and 12½ inches pitch; both of the same weight and area?

Answer: Which propeller would be better depends entirely upon the design of the plane. On one plane the nine inch propeller would be better and on another type the seven inch would be better. If there is any difference the difference would be in favor of the propeller of smaller diameter, inasmuch as the torque would be less and the slip would be greater when the model attains a degree of climb which is too steep. It is desirable when a plane climbs steeply and nears a stalling point, that the propeller thrust should diminish. This helps to prevent a stall. With a propeller of smaller diameter this condition is present more than with one of large diameter where the blade angle is not so great. Also in a climb the smaller propeller would generate more torque as it reached the stalling point. This would cause the model to bank to one side which would prevent the ship from stalling.

Question: Is there any one book that presents information concerning the "Aerodynamic Design of The Model Plane," such as is contained in Mr. Grant's articles of the same name?

Answer: The articles presented in MODEL AIRPLANE NEWS under this name soon will be presented in book form, containing complete information on model design.

Here are some questions of interest from Frank E. Bullock of 754 Naugatuck Avenue, Devon, Connecticut.

Question: How is the angle of incidence of the wing found from charts of the characteristics?

Answer: The angle of incidence usually is plotted horizontally on such charts. Reading from left to right the angle of incidence increases.

Question: How is the lift coefficient determined from airfoil charts?

Answer: The lift coefficient is plotted vertically. Starting at the bottom and reading up, the coefficient increases. If you wish the lift of a wing and the angle at which that lift occurs as indicated by any point on the curve, select the point and then move horizontally to the left and read the lift. Move vertically from this point on the curve to the bottom of the chart and read the angle of incidence.

Mr. Garth Bye of 115 Bellevue Road, Bellevue Hill, Sydney, New South Wales, Australia, wishes to know:

Question: What advantage is presented by variable pitch propellers to planes of today and how are they controlled?

Answer: On a normal propeller with fixed blades the blades are designed with a definite angle, which angle is correct for one particular flying speed. That is, it delivers the greatest efficiency at this speed. Obviously an airplane travels at various

(Continued on page 64)

The Howard DG. A-8S powered with a 420 hp. engine. This is the first Howard plane on floats. (H. G. Martin)

New Materials for Model Building

(Continued from page 5)

friendly manner added by the firm of Gebr. Heller, Schmalkalden and Thuer, Germany, can give the reader only a little impression of what can be made with these tools.

At the end of my essay I should like to attract my American friends' attention to some interesting novelties of German model building which will enable us still to improve the performance of our models. First of all there is the new all-metal propeller with variable pitch. This prop is as light as that of hardwood and is nearly unbreakable. It is natural that it has, because of the variable pitch of its blades, by far higher efficiencies. You can get it with 2, 3 or 4 blades, so that all fancies may be satisfied. Likewise a supplementary gear for two opposite revolving airscrews was developed, as for instance Fritz Koolhoven has shown at the Paris Show in his new pursuit ship with its motor on the c.g., or as the Italians used in their world record Macchi. This driving gear can be obtained for one and also for two rubber motors.

And then I mention a retractable landing gear which could be seen with some high speed models. I will describe it in a few words. When the rubber motor has run down, the rear motor hook disengages a mechanism which releases a valve and lets the undercart suddenly down with the aid of elastics. This construction has proved to be absolutely safe and reliable in a large number of flights—in the moment a landing gear is tried out, that does not earlier release its legs until the prop softly touches the bottom in order to obtain longer distances by a glide with the undercart retracted.

Further I point to the many little wind tunnels which German model builders have constructed of wooden ledges, plywood and pasteboard at the cost of one or two dollars. The motor is usually taken out of an old vacuum-cleaner, the balances are ordinary letter-scales; nevertheless they are able to take simple measures with these primitive resources, so that the model builders can improve their plans further and further by the critical examination of their measures. People intend now to publish construction plans of these wind tunnels so that everybody can build such a thing. An exhibition "School and Aviation" has shown us a larger construction of such a wind tunnel. This one had been built by pupils of a Berlin school. It had a length of about 3.5 mtr., produced a free air stream of 350 mm and had a speed of 12 mtr./sc. Here, too, the balances to measure lift and drag, etc., had been developed of usual letter scales. It is evident that such arrangements are of great worth if model building shall be pursued on scientific principles.

These lines are destined perhaps to give the readers of MODEL AIRPLANE NEWS some new incentives, but above all an insight of German model building. They shall show, that we do not suffer from the loss of balsa, but on the contrary we have developed new construction materials that let us easily forget the balsa wood, in spite of its uncontested good qualities.

Radio Control

(Continued from page 21)

This brings us up to the main point of this phase of radio-controlled models; that is, that their treatment should be more as one would treat a full-sized airplane.

Briefly, it must be understood that work on these highly complicated problems must be studied and careful until we have reached a satisfactory solution. After that it will be a mere matter of improvement, but now we must experiment. Therefore, when we considered construction of a radio-controlled model there were some very definite rules that we laid down for ourselves. In the first place, everything that we did in construction was to be done thoroughly. We knew that the days of slapping on an extra piece of balsa to hold a wing down in a circle were gone, especially when there was something like one hundred dollars of airplane and radio flying around. Therefore, it was our decision to build one airplane, not with the idea of cracking it up or building another one later. This one must be built well enough to stand our experiment and stay together for later exhibitions.

We knew that it would be necessary to build a rather large model since the radio would weigh at least six pounds. As a matter of fact, our first estimate was eight pounds.

It was also obvious that we would be forced to use a rather high wing loading. Our plane weighed sixteen pounds ready to fly, and this would require sixteen square feet of wing area to get the loading down to one pound per square foot. With this in mind, we knew that it would be foolish to use anything but a high-speed wing. Had we used a low-speed wing section, giving a high lift, we still would have had quite a bit of speed, but it would not be enough to make the model really controllable. With a high-lift wing, the model would fly at about twenty miles per hour. This means that there would be virtually no advantage in having controls in any but the slightest breeze.

However, one should not come to the conclusion that it is absolutely necessary to use a high-speed wing section on a radio-controlled model. This is merely a suggestion. Results with high-lift wings will probably be just as good, and after all, this is relatively unimportant when compared to some of the other problems facing us.

It must be understood that the control system be speedy and flexible. It is extremely unsafe to fly the model when there is any appreciable time lag in getting the controls to operate. It must be possible to move controls simultaneously. This will be found to be a great advantage in taking off.

CORRECTION

In the Scientific Model Airplane Co. advertisement, page 39, September issue, the A. C. Spark Plug was listed at 5c; this was an error since the correct price is 75c.

SELECT YOUR CONTEST WINNER FROM THESE SCIENTIFIC GAS MODELS

7 RED ZEPHYRS AT THE DETROIT NATIONALS

The above snapshot was received from Roy Marguardt of Burlington, Iowa. These seven models were constructed by members of his club. All have been test-flown and found to be excellent performers. One model holds twelve different records. The members say, "We're all convinced that Scientific Gas Models are the best."

RED ZEPHYR is present champion of France with 25 m. distance and 1½ hrs. duration records.

MAXWELL BASSETT'S NATIONAL CHAMPION
FIRST PRIZE WINNER DETROIT NATIONALS

Miss Philadelphia

8 Ft. WINGSPAN: 57" LONG. WEIGHT (less motor) 3½ lbs.

An absolute duplicate of the model which took first prize at the Detroit Nationals. Designed by a famous contest winner and offered by SCIENTIFIC so all Model Builders can have an absolute duplicate of this prize winning model. Kit is 100% complete and includes ready shaped leading and trailing edges for wing with the notches cut for ribs; fully finished 14 inch propeller; pneumatic rubber wheels; finished Balsa ribs with notches for spars. Crackproof landing gear; flexible wing supports; high wing stability; beautiful blue and yellow coloring. Can be powered with any standard gas engine. A sensational model easy to build with this complete SCIENTIFIC kit.

$9.95 Postpaid Less Motor

RED ZEPHYR

BIGGEST MONEY'S WORTH IN THE GAS MODEL FIELD

WINGSPAN 6 Ft. LENGTH 56"
WEIGHT (less motor) 2½ lbs.

EASIEST MODEL TO BUILD

This is the kit for the beginner or experienced builder—simplicity of construction combined with extraordinary efficiency. Includes 3½" pneumatic rubber wheels, selected strip Balsa in long lengths, liberal quantities of bamboo covering paper and colored tissue for decoration, finished hard wood propeller, SCIENTIFIC formed landing gear with brackets, all necessary nuts, bolts, wire, electrical connections, etc. Full assortment of supplies, such as sand paper, cement, etc. Two large plans showing and explaining every detail so beginners can complete this model quickly and successfully. This is the finest value ever offered in a gas model—a real record breaker anyone can build. Ask your dealer to show you this remarkable kit, or send your order direct. Satisfaction guaranteed. Complete kit only .....

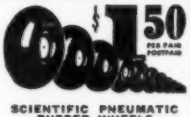
$6.95 Postpaid Less Motor

MISS AMERICA

1st Prize Winner I.G.M.A.A. Contest

Miss America won first prize in the 40 sec. limited event at Hadley Field, May, 1937. Another Miss America won Grand First Prize at Metropolitan Gas Model Meet. This is a reliable, consistent performer and holds its own at every model gathering. Designed by one of America's foremost designers. Kit includes 3½" pneumatic rubber wheels, finished hard wood gas model propeller and is complete with every item required. Ask your dealer to show you Miss America or send your order direct.

COMPLETE KIT **$9.50** Postpaid Less Motor



SCIENTIFIC PNEUMATIC RUBBER WHEELS
3¼" Size for Models 3 to 8 Ft. Black rubber, Aluminum Colored Hubs. Per Pair $1.50

TOGGLE SWITCH
Superior type for gas models; will not stick. Each 39c

ACCURATE FLIGHT TIMER
A necessity for the 45 seconds National Finals. Small size, weight 2¼ oz. Adjustment, 0 to 120 seconds. Silver contact point, switch easily mounted in any position on gas model. Each $3.00

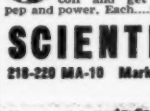
De Luxe Metallic Gray Gas Model Propellers
Most beautiful props on the market; finished with 8 coats Buick - Metalic - Gray auto enamel and hand polished to a Hi-gloss finish. 13" and 14". Each....$1.75

FOR GAS MODELS STRIP BALSA

5 ft. Lengths	Each
⅛x¼	2c
⅛x¼	4c
⅛x⅜	6c
⅛x½	6c
3/16x3/16	4c
3/16x½	8c
¼x¼	6c
¼x⅜	8c
¼x½	10c
⅜x⅜	10c
⅜x½	12c
½x¾	15c

SHEET BALSA

5 ft. Lengths	Each
1/32x2	10c
1/32x3	15c
1/16x2	12c
1/16x3	18c
⅛x2	15c
⅛x3	20c
3/16x2	18c
3/16x3	25c
¼x2	20c
¼x3	25c
½x2	25c
½x3	35c



If your motor is sluggish use this coil and get new pep and power. Each....$2.50

GAS MODEL PROPELLERS
True Pitch, Accurately Carved with Hole drilled. Made of Clear Hard Wood, Natural Finish. 13" and 14" Sizes at lowest price ever for Perfect Props. Each **99c**

Rubber Fuel Lines
For all Engines 6" 20c, 12" 35c

Fuel Tanks
Brown Jr. Type for All Engines. Each $1.50.

Exhaust Manifold
For Brown and Mighty Midget. Each $1.00.

FULL STOCKS ALL POPULAR MOTORS

The New Tlush Super Ace. While they last $19.00.

Aero No. 820 Precision Gas Engine. Special $14.95.

Mighty Midget (upright) Construction kit. $9.85.

Gwin Aero (upright) Construction kit. $11.35.

Also complete stocks of Brown Jr. Model "B" with Steel Piston, also Ohlsson Engines always on hand.

See page 87 for special announcement of new Brown Jr. engine.

Hardwood propeller FREE with every engine purchased

KNIFE SWITCHES
2 Pole. Each 25c
3 Pole. Each 35c

Valvoline Motor Oil
Don't take chances with inferior oil. Per bottle with instructions ..20c

A. C. Spark Plugs
For quick starting, more responsive pick-up, install one of these new plugs. Priced low. Each 75c

Brown Jr. Spark Plugs
Long known as the "miracle plug" for starting baby motors. Formerly $1.50. Now only $1.00

HURLEMAN SPARK PLUG
Easily taken apart for cleaning; leakproof. Each $1.00

ZEPHYR SILK
Strong and light weight. 36" wide. Per Yard.....80c

Condenser
For light weight for all gas motors. Each 20c

LANDING GEAR BRACKETS
Simply insert wire in hole at top and tighten set screws. Complete set of 2 Brackets with 6 set screws Price, Pair 50c.

JACK AND PLUG
Most practical for attaching booster batteries for extra power when starting engine. Jacks each ....10c Plugs each 10c

NEEDLE VALVES
Hardened Steel for Baby Cyclone Motor. Guaranteed. Each 50c

AUTHORIZED DISTRIBUTORS for

PRICES REDUCED M & M RUBBER WHEELS
1¼"; 1⅝"; 1-1/8"; 1⅝"—per pair 60c
1¾"; 1⅞"; 2"; 2¼"; 2½"; 2¾"; 3"; 3½"; 3¾"; 4"; 4½"; 5"—per pair 80c
5¼" per pair $1.50

3¼" formerly $3.50, now $2.75
4¼" formerly $3.75, now $2.75
6" per pair $4.50

SCIENTIFIC GAS MODEL FINISHES
The finish on a gas model does a great deal in making a successful model. Don't take chances with inferior low-priced finishes.
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As for the number of controls, it seems that the highly necessary ones are elevators, ailerons and some shut-off or throttle on the motor. It is also advisable to include a rudder, but this is not absolutely necessary. On our first experiments, we omitted ailerons, but after more careful study of the reaction of an Aeronca to different controls, the author has decided to include ailerons before any flight is attempted. How many times have you wished that you had a pair of ailerons on your gas job as she was "winding up" into a tight vertical bank? With a full and flexible set of controls, we can reduce the hazard of crack-ups to nil.

Remember, when something is made to be put into the plane, make a good job of it. Makeshift apparatus may be used to experiment on the ground, but when that model is flying, it is best not to take chances. To fly a radio model without good control is the same as winding up the motor on an Aeronca or Taylor Cub and letting it take off by itself. The results, sad to say, are certain to be disheartening. Also, picture yourself flying around the country in an Aeronca with nothing but rudder control. It could be done, but overhead would be terrific.

Having arrived at these conclusions regarding the fundamental characteristics of our radio control, we then set to work choosing a definite system which would give us the desired results. To do this, we used a process of elimination, considering all the systems that we knew, and discarding those insufficient to our needs.

Having decided that it would be best to use a system involving four different controls, it became necessary for us to develop some sort of system to select between these different controls. That meant that we had to select between eight different operations, since each of the four controls had an opposite movement, or reversal. Thus, if we set our controls for neutral, we would have two controls for aileron, two for elevators, etc.

The selection system is a device which would act as the "brains" of the radio control, causing the correct controls to be moved when the proper signal is sent up by radio.

Thus far, there have been but two outstanding methods advanced for obtaining this desired selection. The first and most common of these is the dial selector system. In this case a radio wave is received by the plane, reception of this wave causing the operation of a very sensitive relay. This relay will cause a solenoid to pull on a ratchet wheel. At the reception of a single radio signal, the relay will operate by a change in the plate current of the audio section of the receiver, in turn operating the solenoid, which will turn the ratchet wheel one notch. As the ratchet wheel turns, one notch at a time, contacts are made which will move some sort of a controlling device.

Thus, by keeping track of the sequence of the control contacts on the ratchet wheel with a similar wheel on the ground, one can get a form of selection by sending up just the exact number of impulses to make the control wheel turn just the correct number of notches. This gives the desired control. As one can immediately see, there is much chance for confusion and mechanical breakdown when using this method. We discarded it as being insufficiently flexible for what we desired. The system may be used for experimentation, however, but it seems that it has very little future.

The second method hinges on audio selection. That is to say, if we have eight different operations which have to be selected from each other, we will modulate (or superimpose) a low frequency or audio signal on the high frequency radio signal, for each of the eight operations. Thus, we will have eight different audio frequencies superimposed on the same radio frequency. These eight different audio frequencies are chosen at random except for the fact that they must not be harmonically related. Thus, values of 100, 107, 114, 121, 128, 136, 142, and 149 cycles per second might aribitrarily be chosen. If a piece of wire were made to vibrate at each of these frequencies, a musical note, rather low in pitch, would be obtained, different for each frequency, and getting higher with the increased frequency.

To make this a bit clearer, let me give this example. An opera singer is singing into a microphone on some big radio station. She is striking a certain musical note, causing a diaphragm in the micro-

phone to vibrate with a certain definite frequency. It might be as high as 1,000 cycles per second. This causes a variation in the current flowing through a wire in an electric circuit. This is of the exact same frequency as the original note. Then, by means of what is known as a modulator, this audio frequency is superimposed on whatever radio frequency the radio is transmitting.

Then your radio receiver receives the radio wave with its audio modulation, and after it has gone through the set, it exists in the same form as before transmitting; an electric current varying with the same frequency. Then the process in the microphone is worked backward in the loud speaker, and sound comes out of the radio in the form vibration of air particles.

Now to get back to our radio control, there are two methods of modulation and selection. The modulation in transmission may be done either electrically or mechanically, as may be the selection. We chose both mechanical modulation and selection. Remember in this following discussion that selection is merely an "unscrambling" of modulation.

In mechanical modulation, a device similar to a doorbell buzzer is used. Here, when a switch is closed, a piece of iron is deflected by an electro-magnet. However, when it is deflected, it opens a switch, cutting off the current in the electro-magnet, and a steel spring causes the iron to go back to its original position. It can then be seen that the piece of iron will be set to vibrating, at a frequency depending upon the stiffness of the spring. By having eight such vibrating reeds on a common electro-magnet, and having the springs of different lengths on each of the reeds, we will obtain eight different frequencies.

To get the actual modulation, the electro-magnetic coil is hooked up directly or through a transformer to the transmitting set. This is much the same as plugging in a microphone and speaking through it.

Electrical modulation is obtained by using, in effect, eight different audio oscillators. Difference in frequencies are attained by changing certain constants in the circuit. Such a system is less compact and more expensive to construct than a mechanical modulation system.

The matter of modulation is indeed simple when compared to the blank wall confronting you when selection is attempted. It may be said that if it weren't for the problem of selection, radio control would have been perfected long before this. Electrically speaking, it is quite a job to split off some eight frequencies from each other. As yet, we have not arrived at a purely electrical method of splitting the frequencies from one another. It will be found that to select between more than two frequencies will give rise to so many "bugs" that years of experimenting will be required. However, it is possible that someone will uncover some radically new method of electrical selection that will be fool-proof. Until that time, we will have to rely on mechanical selection as the safest.

In the mechanical system, the place of a diaphragm in a loud speaker is taken by eight steel reeds. The actuating electro-magnet has a specially designed gap between which the reeds fit. The reeds we used were $\frac{3}{16}$" wide and but a few thousandths of an inch thick. Lengths of the reeds ranged from 1" long to 1¼" long.

It is probably a well known fact that if a piece of spring steel is held rigidly on one end and tapped on the other, it will vibrate with a definite, unchanging frequency. This frequency is called the natural frequency of that particular piece of steel of that length. The frequency decreases with increases in length, but not in direct proportion.

These eight reeds are then adjusted so that their lengths will give the same frequencies as the eight modulation frequencies. Or the process might be reversed, changing the modulation frequencies to fit the natural frequency of the

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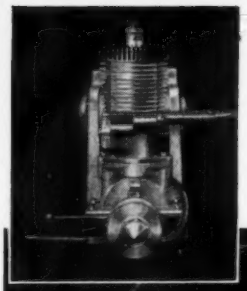

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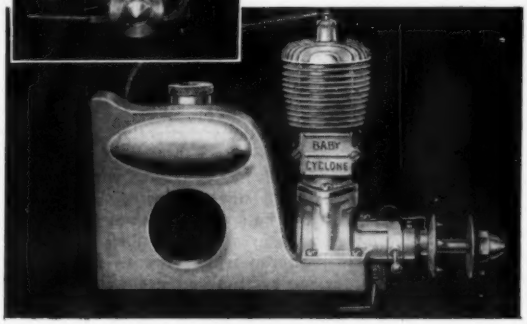

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reeds. It was found that the frequencies must be matched to within less than half a cycle, if selection is to be obtained at all.

Now let us say that an audio frequency of 100 cycles is superimposed on the radio frequency constantly being received by the radio in the airplane. This will result in an alternating curent of 100 cycles per second being fed into the vibrator coil of the reed system by the radio. This means nothing to seven of the reeds, but the eighth one has been matched to this frequency, and it will start vibrating immediately. This, of course, is the phenomenon of "sympathetic vibration."

Words can hardly describe our feelings the first time we tested our reed system, affectionately dubbed "Choe". We used a regular audio oscillator, and played around with the frequency until one of the reeds began vibrating. In this way we were able to get each of the reeds to vibrate separately. We found that in one case, the reeds were separated by only 7/10 of a cycle, yet we had selection! As a matter of fact, the lowest frequency was 112 cycles, and the highest 122, with four reeds between. This was better than we had expected.

As the reeds vibrate, they make and break a contact which is in reality a switch for a sensitive relay which will operate an electric motor. We found that placing the contacts approximately 1/8" apart gave satisfactory results. One of the contacts was mounted on a light spring so that contact was obtained a larger part of the time during each cycle.

One of the pictures shows a shot of our work-bench where the entire radio apparatus was built. The complete radio apparatus is seen with a ruler and hand in the foreground for size comparison.

Also shown is one complete set of batteries. Their combined weight is approximately three pounds. Not shown in the picture is the battery mounting. This is mounted below the metal chassis on which the radio is built. The reed selector system may be seen on the upper right hand corner of the chassis. The metal-covered tube is the detector tube, and the other is the audio. The former was a type 1A6, and the latter a type 33.

On the left side of the chassis are the three (in the first case) electric motors and gears for moving the controls. Motors are reversed by reversing the direction of the current through the field. The upper knob on the radio is for the tuning condenser and the lower one for volume control.

The relays are an interesting part of the radio system. The combined weight of six of them is 2¾ oz. They make and break four contacts, this being necessary to reverse the motors.

Seen in the foreground is the two-cylinder motor used on the airplane.

Naturally, as in all new things, there is a great deal of experimenting to be done, and consequently, a large number of people should become interested and do some work on different radio systems. However, here is a bit of warning. This is decidedly not a one-man job. There should be at least two, one to work on the plane and the other on the radio. Also, it is advisable to get a little backing. Do not go into this thing on a shoestring unless you have a set of cast iron nerves. Your estimated expenses should be around a hundred dollars for experimenting. However, the cost of building a radio-controlled unit for a model will cost a little more than a motor for the same plane, once we have departed from our present hit-and-miss policy.

There is much back-breaking effort confronting you, but go to it with plenty of gusto, for the end in this case most assuredly will justify the means, whatever they be.

A Precision Contest Gas Job

(Continued from page 15)

curve very gradually, using a hardwood stick (about 1" x 1") with corners all rounded off and smooth. The stick must be long enough to reach under one arm so that sufficient leverage and pressure can be obtained with it. The lathe should be operating as fast as possible. After the metal has been completely worked around to the rear face of the wooden form, use a cut-off tool to remove the excess metal and to form the rear edge of the ring. The next step is to polish the ring to a plating finish, which is followed by the use of a narrow lathe tool in cutting through the metal on the front face to obtain the desired size opening (3¼" diameter.) The ring will then fall free from the form. Remove a section of a 1-7/16" circle as shown on cowl detail, Plate 4. This is of course the opening through which the cylinder passes. The holes required on the front face of the ring should be drilled next. The three large holes are 120 degrees apart.

The landing upon which the side panels rest, at their front edge, is riveted in place around the cowl ring as indicated on Plate 4. This discontinues at the cylinder hole. When done correctly, a 1/8" strip will remain for the side panels. Use small aluminum rivets, 1/8" long with 1/8" flat heads, in all small riveting done on the cowling. The spacing of them for fastening the strip just described is clearly shown on the front view of cowl. The center top section of the cowling is made and installed next. It is 20-gauge aluminum (soft.) First cut out the remaining section of the cylinder hole to match that in the ring. Prepare the hinge notches and holes, also the needle-valve and spark-plug wire holes. When all holes are completed, bend the piece to the proper curve required, considering that it is a 2" section of a 4¾" circle. The two small brackets which secure the rear end of the top section to the rear cowl support ring are now riveted in place (one rivet each.) The hinges (which are purchased at any large hardware store) are to be riveted on this center section also, before riveting it to the spun ring. Cut the bracer C-1 and cement it in place with metallic cement.

Proceed to rivet the top center section to the cowl ring (actually the riveted strip.) Obtain some sheet aluminum stock, half hard preferably and 24-gauge, for the two side panels. The hardened variety is preferable so that the side pieces will be springy after being rolled

to shape. Cut two pieces, size each 3¼" x 6-7/16", and remove the section through which the exhaust manifold passes. Drill and install the pair of fasteners on bottom ends of the two pieces. Also file the hinge slots and drill the hinge holes. When all of these operations are completed, take the panels to a sheet metal or tin shop and get them rolled in a rolling machine. Take along a tin can or other object which is about the cowl diameter to use in getting the panels to the exact size curve to conform with the 4¾" cowl diameter. Before going further, make the three cowl support rods from 3/16" O.D. aluminum tubing, as shown on Plate 4. Rivet the two upper ones permanently in the two upper holes in cowl ring. (The lower one is removable so cowling may be removed with motor and tank in place.)

Now rivet the two side panels to the hinges. Trim each one slightly at this point so fasteners snap tightly, with each side panel just meeting and no more. Two 3/16" O.D. aluminum tubing brace rods are made to be used with the cowl. These extend from the two small holes, next to bottom cowl support-rod hole in front ring, to the first engine mounting screw-hole in each engine mounting plate. Flatten the tubing and drill holes in the ends similar to the main cowl support-rods.

The metal ring supporting the cowling at the rear and the engine mounting plates (mounted on the hardwood beams) are shown on Plate 2.

Cut the ring from 20-gauge soft aluminum and punch holes, size ⅜", around the ring for passage of air. These can be drilled if no punch is available. Drill the four mounting screw-holes and also the two holes at the top to which the small brackets on the top section of cowl are attached. Mount the ring on the previously prepared aluminum tubing spacers with 5/16" round head wood screws.

The two engine mounting plates are of 24-gauge galvanized sheet metal. Drill the holes to match those previously drilled in the hardwood beams. The holes for the engine and tank mounting screws should be put in at the same time. (Check your own engine and tank holes for spacing against those on mounting plate illustration.) Bend each plate at right angle where indicated. Mount each one on the wooden beams with 6-32 machine screws (use dural screws and nuts if possible.)

The exhaust manifold, illustrated on Plate 4, is constructed of sheet tin (coffee can, etc.) over a balsa form. The seam is a simple lap joint, brazed. The exhaust manifold should fit tightly between the bottom cylinder fin and the intake jacket.

File two brass pieces to the shapes shown and have them brazed to the sheet tin butt-joints. A little care must be taken in all brazing done on this unit as the tin is rather thin and a brazing torch can easily and quickly burn a hole in it if caution is not used. File the manifold smooth with rounded corners. Drill holes to accommodate 4-36 screws in the solid brass pieces as shown. The strap for holding the exhaust manifold in place is a 20-gauge strip of aluminum. It is suggested that the completed manifold be dull nickel-plated. This "hides" all brazing and gives a one-piece appearance.

An extension will have to be made on the engine needle valve so it may be operated through the cowl. This can be merely a brass screw soldered firmly on the head of the standard valve. Regarding the timer advancement with cowl in place. The writer has always been able to start his engine with the timer in fully advanced position, bringing the engine up to proper r.p.m. through carburetor adjustment only (needle valve.) However, this may not be the case with all power plants. If a timer extension through the cowl is necessary, it is suggested that a slot be cut in the cowl ring to operate an extension lever on the timer.

Tail Surfaces

Both the fin and stabilizer are of identical construction. See assembly drawing (Plate 1) for detail on empennage members.

Cut out the leading and trailing edges, tips and designated ribs from 1/16" sheet balsa of firm variety. All diagonal bracing is of 1/8" sq. balsa. The fin and stabilizer spars should be of very hard stock, especially the stabilizer spar. The dowel pins in fin are of hardwood and should be of such diameter (5/16" approximately) as to fit tightly in the aluminum tubing in the fuselage. The fin tab for torque adjustment is fastened in place with copper or brass wire hinges.

Cover the leading edge of both the stabilizer and fin with 1/32" medium sheet balsa. It is advisable to wet the sheet where it takes the abrupt bend on the actual leading edge of each tail member. The stabilizer fittings for securing it in place on the fuselage are clearly shown on Plate 5.

Wing Panels and Wing Struts

Select very hard, good quality, 1/8" sheet balsa for the wing spars. All other balsa in wings should be medium hard. Due to the up-curve on the wing tips (excellent insofar as lateral stability is concerned) and also the tapering of the wing panels at the fuselage end, the wing spars are rather irregular, being curved for these purposes. After cutting them from sheet stock, begin the cutting of the ribs, leading and trailing edges, and wing tips. To build a wing panel, first slide all ribs over the spars in their approximate positions. Now pin the spars in place over the full-size wing panel drawing. The ribs are now put in position and cemented. The trailing edge (1/8" x 3/8" balsa, tapered in cross-section) is laid down and cemented in place. The wing stubs at fuselage are carved from solid balsa blocks, as shown on assembly drawing, and are securely attached to wing ribs W-1. The wing strut fitting for the wings is shown full-size on Plate 3. The fittings for the wing panel pins, which are very securely attached to the stubs, as indicated are, like the wing strut fittings, formed from 20-gauge sheet aluminum. A hole, which 1/8" O.D. aluminum tubing will just pass through, is drilled through these wing stub fittings and the balsa stub after fittings have been cemented in place. The tubing is spread on each end and hammered over to form a strong rivet, as was done on the fuselage for the stabilizer pins, etc. Each wing panel is covered with 1/32" sheet balsa on the front section, the same as was done on the tail surfaces. Due to the curve at the ends of each wing panel, it will be found necessary to piece the veneer to a certain extent. The diagonal bracing is 1/8" x 1/4" balsa and gussets are added to the trailing edge at each rib for additional strength.

The wing struts are rather unusual in design. Each is formed from 1/2" sheet balsa stock, which should be medium-hard. See assembly drawing for detail on this part. Carve and sand each one to the aerofoil shown on Plate 6. The fitting which slides in between the brass tubes on the landing gear is shown on Plate 4. This is riveted to the struts using 1/8" O.D. aluminum tubing in the same manner as the wing stub fittings. The metal fitting at the small end of the strut is shown on Plate 5. It is also riveted, as well as cemented, in same fashion as the fitting at the base of the strut, but 1/16" O.D. aluminum tubing is sufficient in this application.

Now we shall return to the fuselage for the installation of the windshield and side cabin windows. See Plate 6 for the windshield template. Get good sheet celluloid, preferably .015 thickness, for this work. Be sure it has no prominent scratches on the surface. Using the template, cut the windshield out and install it, using cement carefully so as not to smear the celluloid. Use pins until cement is dry. The side pieces of celluloid are cemented in next and each should be perfectly flush with the balsa surface of the fuselage sides, done by removing balsa around window frames the thickness of the celluloid (see assembly drawing for dotted lines showing this.)

On the original model the writer conceived the idea of shellacking the entire nose construction of the fuselage, from the firewall back to the windshield. This has proved to be most successful in the prevention of gas and oil softening cement joints in this vicinity. Engine fuel will eventually get to most parts of the nose on most any gas job, and by shellacking, no breakdown of cement at joints can possibly result from such a condition. So it is suggested that this be done at this time, just prior to covering the plane.

Covering and Finishing

The writer's model was covered with a good grade of bamboo paper, as it is easier than silk to apply and less expensive. It has ample strength in addition. Cover in small sections where necessary,

such as the fuselage nose, wing stubs, etc. Be sure to cover thoroughly around all the cabin windows, using narrow strips. Cover all solid balsa parts such as the wing struts, and balsa block over windshield. When covering is completed, apply two coats of clear nitrate dope, brushed. In applying the color job to the gas model, use the spray method if at all possible. A much finer finish will result. In preparing the parts for the application of the pigmented dope, first cut some cabin window protectors from gummed paper. Round the corners off. (See photographs.) These are securely stuck to the windows. Be certain that all edges are actually adhering to the celluloid. Other items on the ship should be protected also with paper, such as the wheels, flight timer wind-up arm, etc.

The original is painted all white with bright red trim, which is a very effective and pleasing color scheme. Two sprayed coats of white pigmented dope were given the parts. Trim as desired with the contrasting color as soon as the other has dried. Use a brush for this work. To conclude the paint job, apply a coat of dark "Prism-Lac" type lacquer (novelty finish) if possible, to the inside of the cowl, motor mount and firewall. This is the type of finish usually put on the more modern aircraft instrument panels. If it can be secured in your neighborhood paint store, the application is well worth the while in such a place, as far as final appearance of the model is concerned.

Assembly

Mount the engine and fuel tank on the mounting plates first. Hook up the timer, ground and spark-plug wires. It is a good idea to check the engine operation before the cowling is installed. If it is running okay, proceed to put the cowl on. This is done by first removing the lower cowl support rod. The cowling, with sides raised, is now lowered over the cylinder, with the needle valve removed and the spark-plug wire guided through the hole provided as cowl is lowered. Work it on, holding the two upper cowl support rods away from their respective studs, until they are in line and can be slipped on. Now put the two upper stud nuts on and tighten. Connect the spark-plug wire to the plug and put the needle valve back in place through the cowl hole. Now fasten the top stationary section of cowling to the rear cowl support ring. The lower cowl support rod is now put in place, the rear end being secured to the lower stud with a nut and the front end to the cowl ring with a 6-32 screw. Remove the first motor mounting screw from each plate preparatory to putting in the 3/16" O.D. aluminum tubing bracers, which extend from the bottom of the cowl ring to these first mounting screws. The lower ends are secured to the front cowl ring with 3-48 screws and nuts. This concludes the cowl installation.

The fin should slide in the fuselage on its pins rather tightly. The stabilizer pins, previously prepared and illustrated on Plate 5, are merely put through the stabilizer fittings and fuselage and the nuts tightened. The wing panels and also the landing gear ends of the struts are held in place with lengths of brass wire of such size that it will just pass snugly through 3/32" O.D. tubing, such as that which runs across top of fuselage under the hatch for the wing pins.

To connect the wing struts at the wing panels, use two 3-48 or 2-56 brass screws and nuts. The design of the wings and struts on this gas model allows them to separate from each other should the need arise. Also, as all parts are readily demountable, the plane is easily carried in an automobile, consuming little room.

Flying

The original model balanced for a flat glide almost perfectly upon completion.

A slight bit of negative adjustment on the stabilizer was all that was required. It is not too crtical in obtaining the correct glide, due to the long moment arm. The "Autoknips" timer, as used on this gas job, has an average run-down time of 45 seconds, which is excellent in completing test flights.

An All-Balsa Sportster

(Continued from page 7)

both sides and cut away these wedge-shaped pieces also. The blank is now ready for carving. The propeller is a right-handed one, that is, looking at it from the front it turns in a counter-clockwise direction. The photo shows in which direction the blades must face. Extreme care must be used in the carving process. Hollow out the bottom of the blades slightly. And do not make the blades thicker than 1/8" where they are widest. Put a pin through the center and balance the propeller before sanding. When sanding, round all the corners. Apply 4 coats of banana oil with intermediate sandings. For bearings use 2 cotter pins or brass paper fasteners. The drawing shows how to work these into bearings. A hole is drilled through each, and one is inserted in the front of the nose block, the other in the rear. A free-wheeling device may be made as illustrated but any other proven type may do. Note the slight down thrust applied to the propeller. This keeps the model from stalling when under full power and yet permits a flat glide when the power is exhausted. The free-wheeling, by cutting down the propeller resistance at this time by allowing it to rotate freely, increases the gliding angle.

Flying

First glide the model in a field. If it stalls move the wing back, if it dives move it up. Incidence may be adjusted by bending the wing clip as shown on the plan. There should be a slight positive incidence in the wing. For average flying use 6 strands of 1/8" flat rubber. For stunt flying use 8. Allow a few inches of slack so as to get a good number of winds.

Building a High Efficiency Soarer

(Continued from page 30)

later. For good results, lay the frame to be covered, on a piece of tissue slightly larger than its outline, the excess tissue to be used for overlapping. Use banana oil for best adhesive. With a brush, apply a quantity along the leading edge of one of the sections and press the section down tightly onto the tissue. This done, brush the bottom of the ribs and the trailing edge. The bottom of each rib must be brushed as the tissue must stick to it in order to get the maximum efficiency out of the rib section, the lift too being greatly increased. It is not necessary to glue the tissue to the top of the ribs as the tension of the tissue will hold it down tightly enough. So in covering the top of all sections, only the leading and trailing edges may be brushed with the banana oil. Care must be taken in applying the tissue so that no wrinkles are left. The tail surfaces are done in the same manner, cutting just enough tissue for each surface, as too much overlap makes for an unsightly appearance.

Before assembling the four wing sections, pin each one down by its four corners to a flat board. Then spray them lightly with a squirt gun. This operation assures a tight surface and eliminates all wrinkles. The pins are used to prevent warp while they dry. The same is done with the bottom surfaces of the wing and tail surfaces. This done, brush on two coats of clear dope. This is done with a very soft brush and spread well. The second coat is applied only when the first is dry. Pin the surfaces down for this operation also, just as a safety measure.

Attaching the four sections of the wing together requires a jig of blocks of the corresponding heights indicated on the plan. It is best to cement the two center sections together first, giving them the proper dihedral angle of 3¼ in. and resting the ends on the blocks. When these are dry, cement the tip sections on, hold-each tip up with a larger block of 5 inches for the tip dihedral. Cement these well, at the same time being careful that neither tip has more incidence than the other. When this is dry your wing is then complete. Do not place the wing in the fuselage groove until you have cemented the stabilizer into its slot. The slot must be at right angles to the vertical axis of the fuselage or the stabilizer will not be level. When it is placed and cemented, the rudder is cemented on the section directly above it and at exact right angles to it. The curve lines on the plan shown leading from the rudder to the fuselage, indicate the location of bamboo strips of 1/64 dia. These strips are built on and curved to position as shown. Then they are covered with tissues and coated well with banana oil. This arrangement provides the greatest streamlining possible for the tail unit.

The tail unit will now provide the aligning medium for the wing. Cement two 3/32 flat sheets of about 1/2"x 1" in the wing groove, at the position where the spar will be and meet them in the center of the groove. These will give the proper incidence to the wing. Stand the fuselage on its belly so that the stabilizer is parallel to the table top, and prop in that position. Pile cement into the wing groove. Then carefully place the wing into the groove and press it into the cement. Be careful that the wing is lined up correctly from the top view and see that neither wing tip advances forward more than the other. Dihedral on each tip must be watched also, using the blocks if necessary. The wing will then be properly adjusted.

Using plastic wood, fill in the area beneath the wing at the root where it meets the fuselage as indicated on the plan. Continue over the top of the wing with it, as this will provide the maximum strength. This material is best worked in with the fingers if they are dipped in benzine. When this filleting is dry sand to a smooth finish, by using sandpaper wrapped around a 1" dia. bottle. This is then doped for a smooth finish. This filler must not be applied till the wing is perfectly dried onto the fuselage.

Flight Instructions

Now that the model is completed, it is

adjusted for flight by balancing with lead weights or clay. Use a great deal of discretion in picking a day to fly the model. For test flights, a calm day should be sought, with a wind velocity of not more than 8 m.p.h. However, should you wish to make some real time, choose a nice hot summer day with plenty of thermal currents. Test flying requires a bit of skill in order to get results. Glide the model a few times to correct any stalling or diving tendencies. For lateral stability, be sure that it has no tendencies to bank or turn sharply.

For an initial tow-line launch, attach a small "S" hook to about fifty feet of silk thread, and in turn attach this to the front hook on the model. Face the model into the breeze and stretch the line until taut. Then when your partner releases it from his grasp, walk forward slowly, breaking into a trot thereby increasing the flying speed causing the model to rise. Look back to observe its progress and action. If it rises steadily run a little faster, then come to a halt, allowing the tow-line to drop and the model to continue on. Should the model drop a wing tip during the climb, change you run to the high-wing side thereby bringing the lower tip up. Never try to attain more speed with a sudden jerk, as this will throw stability out somewhat losing altitude. A little experience in towing, will teach you many tricks in jockeying your soarer to high altitudes. The ship presents a graceful appearance when in full flight.

On Frontiers of Aviation

(Continued from page 11)

stitute for the New York-Paris Race which was forbidden by the U. S. Department of Commerce. The starting point will be Marseilles. From there the planes race on a course somewhat similar to that of the MacRobertson Race to Damascus, Syria, located in the Holy Lands. From there the planes turn back toward the finish line at Paris. Jimmie Mattern was hopeful of competing with his brightly decorated Lockheed 12 and it is rumored that Laura Ingalls will participate with a twin-engined Lockheed Electra. The Mattern plane carries so much fuel that the construction of it had to be reinforced to hold the added weight.

MODEL AIRPLANE NEWS will bring you further details of the numerous planes in this race and your correspondent expects to make a speedy flight from the west coast to Cleveland in time to see the start and finish of the National Air Races and bring you all the dope on the ships and events there.

A small two-place, low-wing, cabin monoplane is now undergoing test flights under the guidance of Jan Rouffaer, its designer. A novel feature is that the windshield is well forward and covers part of the engine. The fuselage is of welded steel tubing and the wing is of metal frame construction, all with fabric covering. The landing gear is well forward in the nose of the little plane. Most interesting of all is, however, its engine,

which has been designed by Jules Dusevoir, who designed the original 6-cylinder Chevrolet engine. It is a very low-priced engine of 80 hp. and weighs only 150 pounds.

The U. S. Navy has ordered two Stearman-Hammond pushers and will equip them for radio control. Since the Hammonds have only two controls, there being no rudders, they will be very suitable for radio operation. The radio in the ships will be connected to mechanical robots and the planes will be able to fly without any pilot aboard.

Curtiss-Wright Tech students have been building an all-metal sailplane for Charles Patterson of North American Aviation Corp.

The new Grumman amphibian for the private owner has met with great success. Following are the names of several distinguished people who have been the first to place orders for the new swift planes. They are Wilton Lloyd-Smith, Marshall Field, C. W. Deeds, E. Roland Harriman, Henry S. Morgan, Col. Robert R. McCormick, Capt. Boris Sergievsky, Powell Crosley and the Asiatic Petroleum Co.

Construction is rugged like that of the Grumman Navy jobs. Specifications are as follows:

Wing span—49 feet
Overall length—38 feet 3 inches
Overall height—12 feet 2 inches
Wing area—375 sq. ft.
Power loading—9.37 lb./hp.
Wing loading—20 lb./sq. ft.
Weight empty—5320 lb.
Useful load—2180 lb.
Gross weight—7500 lb.
Fuel capacity—220 gal.
Oil capacity—15 gal.
Top speed—205 m.p.h.
Cruising speed—184 m.p.h.
Landing speed—60 m.p.h.
Rate of climb—1490 ft./min.
Absolute ceiling—25,800 ft.
Max. range—1,150 mi.

Here is something to add to the list of super transports published on page 62 of the August issue of MODEL AIRPLANE NEWS. The Junkers company will have a new giant all-metal 40-passenger transport completed by autumn. Known as the Ju. 90, it will have four engines of about 800 hp. each and will be of mid-wing design. All three landing gear wheels are retractable. Total weight is 44,800 lb.—top speed about 235 m.p.h.

If TWA is successful in purchasing Eastern Air Lines it will undoubtedly mark North American Aviation Manufacturing Division's entrance into the commercial field of the aviation industry. North American now owns Eastern Air Lines and under present laws a manufacturer of commercial aircraft may not be connected with an airline. For that reason North American has been building only military aircraft, but if she sells E.A.L. we may see something big and vital in the way of a transport plane emerge from the North American plant.

In Great Britain, where airplanes, next to ours, are the best, a noticeable trend has taken place on their military ships towards moving their vertical tail surfaces well forward of the horizontal tail units. Of course this feature has been present on a few previous types of British planes, but not as frequent as this year. The new Gloster F5/34 single-seat fighter and the Blackburn dive bomber have their fin and rudder much forther forward than the stabilizer and elevators. When planes with conventional tails are in a spin sometimes the horizontal tail surfaces are apt to blanket out the vertical surfaces, and therefore by moving them forward this is eliminated. However, this feature has its setbacks as it lessens the moment arm of the rudder, and therefore is not as effective in ordinary flight.

The new Gloster fighter is another low-wing, all-metal airplane with a Bristol Perseus engine in its nose. The cross-section of the fuselage is circular in shape with plenty of circumference all the way from the nose to the tail. The pilot's enclosure is exceedingly small in comparison. Wing span is 38 ft., length 31 ft., and height 10 ft.

Another noteworthy English achievement, though it has the popular glass enclosed "penthouse" effect above the fuselage as a crew enclosure, is the Blackburn dive bomber. It is an all-metal low-wing airplane with folding wings for use on Navy aircraft carriers. An 880 hp. Bristol Mercury with cowl cooling flaps is in the nose.

A two-seat trainer has been developed from a Miles low-wing monoplane. A large Rolls-Royce engine has been installed in the nose and a fine job has been done all round, making the ship excellent in appearance. Putting a Rolls-Royce in a Miles is like installing a Curtiss Conqueror in an Aeroneer sport plane.

The new low-wing DeHavilland trainer has been completed. It is rather large with one of the new in-line 450 hp. Gypsy King engines up front. The landing gear is retractable. The pilot sits forward in an enclosure and the student occupies a gun turret directly aft.

In connection with the policy of the Navy Department to explore the value of large flying boats in national defense, the largest patrol bomber yet constructed is nearing completion in the Sikorsky factory at Bridgeport, Connecticut.

This huge flying boat, designated by the Navy as the XPBS, represents one of the most powerful bombing planes in the United States, having a military load carrying capacity comparable with that of any known existing airplane. It will also have the usual long range demanded of Navy patrol bombers as exemplified by the twin engine PBY patrol bombers recently flown nonstop from San Diego to Honolulu and the Canal Zone. It will afford the Navy Department an opportunity to compare the relative value as a national defense weapon, both from a tactical and an engineering viewpoint, of the large four engine type and the smaller twin engine type.

Under strict government control and with utmost secrecy, the Sikorsky XPBS has been under construction for more than two years. Hundreds of thousands of man hours of engineering and shop labor, and thousands of detail drawings have gone into the construction of this huge craft. The make-up alone, constructed of wood and fabric, took six months to complete, and when finished was a full scale

replica, complete to the most minute detail of the ship to be built.

The XPBS is a four engined, all-metal, high-wing, full cantilever monoplane flying boat of new design. It is powered by four Pratt & Whitney twin Wasp engines of 1050 horsepower each, and is equipped with Hamilton Standard constant speed propellers.

The XPBS exceeds previous Sikorsky commercial flying boats in weight by some five to six tons. While previous Sikorsky flying boat designs have employed the wing up and above the hull and used semi-cantilever strut bracing, the wing of the new Sikorsky patrol bomber is full cantilever, and flush with the top deck of the hull, and because of the height of the hull provides ample clearance for propeller operation.

Armament consists of bow, rear and center gun turrets incorporating many new features in armament design.

The new plane is now being groomed for its first flight which is scheduled to take place in the very near future. Trial flights are to be made over Long Island Sound adjacent to the Sikorsky factory throughout the remainder of the summer, when this flying dreadnaught will be delivered to the Navy Department.

Build a Model of the Caudron Typhon

Abroad there are a great variety of airplanes to be entered in the Marseilles, Damascus, Paris Air Race, but the outstanding one is the Caudron Typhon. There are rumors that three of these may be built for the race, and since they look so much like the DeHavilland Comets that participated in the MacRobertson Race it will be interesting to see if they will do as well as the Comets.

A few Caudron Typhons have been built as mail planes in France and have seen much service. Recently they have been substituted by our own Bellanca ships that much resemble the famous low-wing Bellanca racer. Almost the full complement of 20 Bellancas have now been delivered to the French government airlines for mail use. These new Typhons to be built solely as racers will have exceptional performance and will be outstanding contenders.

The most noted flight of a Typhon of recent date was made on May 2 by M. Arnoux and M. Beujol from Paris to Algiers and return in the short time of nine hours and 35 minutes. They averaged about 180 m.p.h. for the 1,750 mile nonstop flight! Their Caudron was powered by two Renault engines.

It is comparatively simple to build a model of the Caudron Typhon because of its simple lines. Construct the entire model from balsa wood purchased from your favorite model company. Make the fuselage first. Trace the outline of the top view on paper. Lay the paper on stock with grain of wood running lengthwise and go over outline heavily with pencil so as to make a groove in the wood. Then cut to shape with a jig-saw. Draw the side view of the fuselage on stock next

and cut around this outline also. Shave down the corners with a razor blade as shown by cross-sections. Go over the surfaces with coarse and then fine sandpaper.

Make the right and left wing panels next. Draw their outlines on balsa and cut to shape. Make sure the grain of the wood is running lengthwise with the wing. Taper down the panels as shown in the front view of the model with a sharp chisel and then form the airfoil contours as shown by sections E-E and F-F.

The engine nacelles are made in the same manner as the fuselage. Be accurate and make sure that both nacelles are identical. See that they fit snug under the wing. Shape out two spinners with your razor blade from scrap wood. Join to these two blades cut from sheet balsa, forming propellers. Joints may be made with the use of model cement. A small straight pin injected into the spinner and into the nacelles may act as a propeller shaft.

The tail is very simple to make. The rudder, fin, stabilizer and elevators may be cut from sheet balsa with a razor blade and then sandpapered to smoothness.

The assembly of the model is the next step. Lay the fuselage in flying position on a flat surface with props to hold it in place. Join the wing panels to the sides of the fuselage with sufficient model cement to make a firm connection. Then cement the tail units in place. When wing joints have dried, connect the two engine nacelles with cement. The landing gear may be installed if desired, but the model looks exceptionally well when mounted on a stand as if in flying position with landing gear retracted. Model mounts may now be purchased at almost any model counter or model airplane company. Go over the entire model with fine sandpaper and then it will be ready for the paint job.

Dope the entire model vermilion with the exception of the silver propeller blades and the white cockpit enclosure. Many coats will have to be applied before a smooth finish is obtained. Apply good wholesome but even coats at first so that all the pores in the soft balsa are filled. Do not apply a second coat until the first has dried. It might be well to go over the entire model with fine sandpaper once more after the first coat has dried. After several even coats have been applied the model will be complete.

Build this Flying Stinson Trainer

(Continued from page 23)

per are all that will be necessary. Both must be exactly alike before they are cemented in position. And don't use the cement sparingly here.

The landing gear struts are cut to shape from hard balsa to the design shown on plates 1 and 4. Note the careful streamlining. Before attaching the struts to the wing stubs, make the wheel pants. Each pants is made in halves. Insert the wheel with its shock absorbing wire axle and after an application of cement press the parts firmly together. The wheels may be either aluminum and rubber tired or celluloid. The method of attaching the pants to the landing gear struts and they in turn to the wing stubs are clearly shown on plate 4. Slivers of bamboo about 1/16" thick for the upper and lower segments are inserted as shown and with an application of cement all parts are pressed firmly together. At this time place any object underneath the tail wheel so that the tail end of the fuselage will be out straight and that the weight will be directly on the landing gear. Allow sufficient time to harden in this manner.

Wings and Center Section

All the dimensions concerning the wing layout are given on plate 3. Cut the ribs to shape as shown. Rib 1 is slanted slightly to provide for the dihedral angle. Each wing is made individually and with care.

The strut braces are pieces of 1/16" sheet balsa cemented in the position shown. Sand down all joining ends for smooth finishes. The center section has a curved balsa leading edge and a bamboo trailing edge. The wing panels and the center section are covered individually and on both surfaces. Before applying dope or banana oil, water spray these parts to shrink the tissue. The next step is to cement the wing panels to the center section. Place small objects at the extreme tip of each wing to assist in holding the dihedral angle intact until the cement hardens.

Tail Surfaces and Assembly

The elevators are made in halves and covered on both sides. The rudder is made in the same manner of construction and also covered on both sides. Care should be exercised in covering the fuselage because of the longitudinal stringers above and below the fuselage which are bound to cause wrinkles if the job is done otherwise. Use banana oil for the adhesive and after the job is completed spray lightly with water. The rudder and elevator parts may now be attached. A balsa brace strut extending between the rudder and the top surface of the elevator is cemented in the position as indicated on plates 2 and 4. Check the tail for positive alignment.

Before assembling the wing, cut to shape, streamline and have in readiness all the struts lettered A to H as listed in the upper right hand corner of plate 4. Two of each strut will be necessary. The first step is to cement the center section struts in position. These are designated by the letters C, D and E. Just as soon as the cement has hardened sufficiently, place the wing in the exact position as shown on the plans and apply cement to all joining parts. While this operation is taking place the tail should be kept high—as if in level flight. Check for the angle of incidence now and make sure it is set correctly before the cement hardens. Struts A and B are immediately rigged into position and small model-making pin inserted part way for additional strength. Later remove the pins. The vertical connecting struts lettered F, G and H which form the letter "N" when they are attached are next to be cemented into position. Struts G and H are shown by the dotted lines in the center section view on plate 1. Thread bracing is applied as shown

in the front view on plate 4.

The propeller is cut to shape from the pattern given on plate 3. The carving is done in the usual manner. Drill a pin-sized hole in the center of the hub and insert the prop shaft, then bend it and imbed it securely into the hub. Apply a thin coat of cement over it. Before shaping the shaft slip on two brass washers one of which is cemented flush to the rear of the hub and the other left loose. Then slip through the nose plug and finally curve the shaft hook. The method in which the rubber motor is placed into the fuselage is simple. By removing the nose plug first and then placing the rubber in the hook take time out to bring the hook to a closer circle thus preventing any possibility of the rubber slipping off, then lower the power strands into the belly until it can be slipped onto the rear hook. For longer flights, remove the nose plug and wind with a rubber gear winder. Do not wind from the tail end. The model requires five strands of ⅛" flat rubber for motive power. Lubricate well before placing it in position.

Trouble isn't usually to be anticipated when attempting to test fly your model for the first time though it is sometimes necessary to make certain adjustments. Our Senior Trainer being a very lightweight job as flying scale models go had a tendency to "mush in" on her landings several times. Should this incident occur while testing your model, you can remedy it by simply adding a bit of lead weight up in the nose just behind the nose plug. Add a bit at a time. After a few flights R.O.G. and by hand-launching you will be able to satisfy yourself with its "performance ability." The model is possessed with unusual stability and when hand-launched with "full throttle" prepare yourself for a little hike.

Stabilizing Your Duration Model

(Continued from page 13)

allowing it to fall off to one side or the other out of a stall. In such cases, whenever it starts to fall to one side, the fin acts as a medium to turn back the model into the stall. Probably some model builders will recall having seen this action take place in the case of indoor models. Such models fly perfectly until a certain degree of stall is reached, at which point it appears that it is impossible for them to recover. Usually the maneuver ends in a tail-slide backward. Considering the qualities induced by a very high or a very low fin it is evident that a medium condition is probably the best; i. e., part of the fin should be below the line of stabilizer and part above it. We suggest that one-third of the area be placed below the stabilizer. The shape or outside contour in all cases should be made so that the resistance is reduced as much as possible. Obviously the square-shaped fin with corners would cause more resistance than a fin with a gracefully rounded outline. Usually a fin with an elliptic shape produces the greatest effect with the least amount of resistance and weight. In all cases a fin should be carefully blended or curved into the fuselage at its root. If possible fillets should be used. If the body is of the monocoque type it may be shaped so that the fin blends into it in smooth curves.

On all models the fin should be set parallel to the line of thrust or to the center line of the fuselage. This statement may startle some model plane builders, especially those who have been used to setting the fin at a slight angle in order to counteract torque. Whenever it is necessary to have the fin set at an angle, it is because it has been improperly designed in the first place in respect to area. Whenever a fin is too large it is necessary to counteract the torque by setting it to one side. If the designer is clever he will make the fin of such area that this is unnecessary. The reader will recall that in a previous article it was stated that the model could be made to turn against the torque by making the fin area extremely small. Torque effect should be counteracted by making a fin of correct area rather than by setting it at an angle to the center line of the fuselage. The later method in all cases decreases the flight efficiency of the model to a certain extent. It is a case of a second fault being used to correct an original fault which never should have existed in the first place.

Though the general rule for fin areas will be accurate for the majority of cases, the designer who wishes a fine degree of accuracy should carefully calculate the area required by means of a formula which takes into account the wing span, the length of the nose, the diameter of the propeller and the length of the moment arm. Variations

in any one or several of these different factors affect the fin area. This area may be calculated from the formula as follows.

$$a_F = a_F\left(\frac{D}{S}\right)+\left(0.067\right)\left(\frac{A}{M}\right)\left(3+N+0.58\sqrt{ST_r}\right).$$

In the formula: a_F represents required fin area, D = propeller diameter, S = span of wing, A = area of wing, M = fin moment arm, N = length of the nose and T = the amount each wing tip is raised above the center point of the wing. Now, substituting the numerical values of the factors represented in the formula, we have,

$$a_F = a_F\left(\frac{18}{46}\right)+\left(0.067\right)\left(\frac{200}{23}\right)\left(3+14+0.58\sqrt{46(3.75)}\right).$$

Simplifying,

$$a_F - a_F = (0.582)(24.62)$$

$$a_F = \frac{(0.582)(24.62)}{(0.61)} = 24.14 \text{ SQUARE INCHES.}$$

Thus the fin area, a_F = 24.14 square inches which is the required amount of fin area for this duration model. Actually this value is very slightly over 12% of the wing area, which is 200 square inches.

The general rule for fin area specified 24 sq. inches as the proper amount to use so it can be seen how accurate results may be obtained by applying the rule instead of working out the formula, in the case of normally proportioned models.

The amount of stabilizing area is our next consideration; the stabilizer's function is to insure longitudinal stability. By placing the center of gravity low or in other words making the wing high, we have contributed to the longitudinal stability of the ship. Therefore, less stabilizer area may be used than would be required in cases where the wing is placed directly on top of the fuselage. Another thing which affects the amount of stabilizer area which should be used is the type of airfoil section used on the stabilizer; i. e., less area may be used if the stabilizer is made with a cambered section rather than a uniform section. In such cases the stabilizer is called a "lifting tail" insomuch as it carries part of the weight of the airplane.

It is always the objective of the designer to use as little material in the construction of his plane as possible and yet have each part function efficiently. It is advisable, therefore, to use the cambered type of stabilizer for it may be made 20% smaller than the stabilizer of uniformed section. In average models the rule is—make the stabilizer area ⅛ of the wing area. If it is made with less area than this usually the plane will be critical and will lack the degree of stability which will give maximum efficiency. It is customary on duration models to make the area of stabilizer larger than this. Some designers make the area equal to 50% of the wing area. This is excessive and detracts from the efficiency of the ship. All that is required in any model is to make the plane sufficiently stable. Any steps taken beyond this point to stabilize the ship are unnecessary. If the stabilizer is made with an area equal to 40% of the wing area a high degree of stability will exist.

This discussion refers to stabilizers with uniform section. However, it has been desired to use a cambered stabilizer on the duration model, therefore its area may be reduced by an amount equal to 20%. This means that the area of the cambered stabilizer may be only 33% of the wing area. In determining this area, the stability resulting from the low center of gravity has not been taken into account. In the average case the stabilizer area may be reduced 10% because of this condition. Thus for a stability model the area of stabilizer may be 30% of the wing area when a cambered section is used. This calculation is based on the condition that the propeller diameter is one-third of the wing span. Usually this is small for duration models though this proportion is used in some cases. As a rule, the diameter of the propeller of such a ship is approximately 40 to 45% of the wing span. In the model which is being designed a maximum diameter of 40% has been chosen. Due to the greater gyroscopic effect that a propeller of 40% of the wing span will have relative to a propeller of one-third of the wing span, the stabilizer area will have to be increased about 10%. Thus the area of the stabilizer for this duration model should be equal to about 33% of the wing area, or 66 square inches. This amount of area will insure a high degree of stability without detracting from the efficiency of the plane. This is the least amount advisable in such a case. As in the case of the fin, the area of the stabilizer may be calculated with greater accuracy by means of the formula which has been used in previous articles.

However, the angle that the stabilizer should be set at relative to the thrust line should be determined before this is undertaken, as the angular difference between the wing and the stabilizer enters into the solution of the formula.

In the case of models, the wings of which are "parasoled" the stabilizer should be set at a slightly positive angle. In cases where it has uniform section the angular setting should be about one degree positive with the line of thrust. However, in this case, we are using a cambered section; a Clark Y section is a good one to use. Insomuch as cambered sections lift at a negative angle, our cambered stabilizer here must be set so that it is one degree positive to its angle of zero lift. This zero lift angle is about three degrees negative to the line of thrust, therefore the chord of the stabilizer section should be set at two degrees negative to the line of thrust. By "chord" is meant the line which passes through the leading and the trailing edge of the section. The design of the Duration model will be concluded in the next issue of this magazine.

N.A.A. Junior Membership News

(Continued from page 29)

test at Smith Playground in Boston on August seventh under the direction of Gunnar Munnick, Contest Director.

St. Louis Chapter will hold a World Indoor Records Trials Meet under the direction of Mr. H. T. Sommers, Contest Director, at the Arena Building, St. Louis on August 7.

Quaker City Gas Model Ass'n will hold a gas model meet on August 7th at the North East Philadelphia Airport, under the direction of Mr. William S. Berry, Contest Director.

Chicago Aeronuts will hold an outdoor meet at the Devon and Lincoln Field August 7th, under the direction of Mr. Carl Goldberg, Contest Director.

Linden City Model Airplane Club will hold a rubber-powered meet on August 7th and 8th at the Stiles Street Field, under the direction of Mr. Frank M. Krysiak, Contest Director.

Chicago Aeronuts and Chicago Park District clubs are sponsoring a gas meet

to be held August 8th, under the direction of Frank Nekimken and B. C. Friedman, Contest Directors. This meet promises to be a big success. Entries have already been made from several other states. It will be held at the Harlem Airport, Chicago. This meet was helped along by the fine cooperation of the NAA Junior group at Rockford, who very splendidly offered to change the date of their meet which was scheduled for the same day, just to accommodate the Chicago groups.

Chicago Aeronuts will hold an indoor meet on August 14th, at the 132nd Infantry Armory, under the direction of Mr. Carl Goldberg, Contest Director.

Wichita State Championship Model Meet will be held at the Wichita Municipal Airport on August 15th, under the direction of Mr. F. X. Downey and Mr. Lewis A. Shore, Contest Directors. This promises to be a swell one too.

Linden Model Aircraft Club will sponsor a Union County Gas Model Meet to be held at Hadley Airport, South Plainfield, New Jersey, on August 21st. This new chapter is making a fine start.

The Scripps-Howard Junior Aviators will hold the National Scripps-Howard Junior Races August 30th to September 2nd, under the direction of Mr. Howard M. Jellison, Contest Director. This Meet will be held at the Akron Municipal Airport and it is expected that 1500 people will participate.

St. Louis Chapter will hold the Mississippi Valley Model Airplane Meet on September 3rd and 4th at the Arena Building and Parks Airport, under the direction of H. T. Sommers, Contest Director.

Jordan Marsh-Boston Traveler Junior Aviation League will hold a Model contest at Smith Playgound in Boston, September 4th, under the direction of Gunnar Munnick, Contest Director.

New York State Fair Model Airplane Meet, sponsored by the Syracuse Model Airplane and Exchange Club, will be held at Syracuse Airport, Syracuse, under the direction of Harry C. Copeland, Contest Director.

Quaker City Gas Model Ass'n will hold a gas model meet September 11th at the North East Philadelphia Airport, under the direction of William S. Berry, Contest Director.

New NAA Contest Directors

Jack Schwartz—Philadelphia, Pa.
J. K. Coppage—College Park, Georgia
Thomas Stephens—Indianapolis, Ind.
Arthur J. Vhay—Detroit, Michigan
Dr. Hugh D. Wilson—Topeka, Kansas

Gas Lines

(Continued from page 20)

the least chance of harming anyone—it has either been at an airport with permission or in some vacant field far from homes and certainly not harming anyone.

"As for the remarks in this article referred to above—a person familiar with flying of any kind would surely know that it is very rare that an airplane flies close enough to earth to come in contact with one of these tiny toy models. Neither do these small craft soar aloft usually to any such great heights that they would harm any other occupants of the vast blue. The sky is certainly not like a busy city street so jammed with traffic that one cannot move to the right or to the left. Nine times out of ten these tests are conducted under strict supervision and with the full knowledge of the people where the experiments are to be held.

"If anyone is so narrow-minded as to think that people are injured by these little craft, it is mostly their own fault. I have been with the boys when they were experimenting with their planes or flying in contests and the curiosity of the onlookers was so great and their common sense so small, they would crowd onto the field overrun every guard and restriction and be so constantly under foot and where they should not be, that it was only a miracle if they escaped harm. Then, too, they would crowd so close to a contestant he would hardly have room to move around to properly send his craft aloft.

"Why one should think that this fascinating occupation should be taken away from the youth of today is beyond human understanding. It keeps the boys out of mischief, most certainly improves their minds and gives them something to think about that is a major problem in itself. It seems to me that only someone who perhaps has been a loser or who is most disgruntled in some way at the outcome of their efforts in this direction could be so inconsiderate as to think that for one minute gas models should be scrapped.

"They should be allowed to continue and

boys encouraged to the fullest to test their ability. The ones to be discouraged are the doubting Thomases and the curious onlookers who so constantly get in the contestant's way and hamper him in his efforts to achieve success.

"Model building always has been and always will be the elementary schooling of our air men of tomorrow and should be encouraged to the fullest in every phase of its work."

We have just received some very important information concerning one of the leaders in the fight for gas models. Strange to say this leader was not harmed by a gas model, but in a large ship. Mr. William R. Enyart, Secretary of the National Aeronautic Association, was unfortunate in being in an airplane accident and as a result is in the hospital with serious injuries. We understand he is now out of danger and will shortly return to the ranks to continue the fight for the education of American youth. The I.G.M.A.A. extends very best wishes to Mr. Enyart and hopes he will soon completely recover from his misfortune.

We have a letter from Leslie Mitchell Adams of Atlanta, Georgia, Box 64, Station C. Mr. Adams is one of the leaders of gas model activities in the south. He writes as follows:

"Here is some more 'fodder' to place in the well known 'editorial cannon.'

"To begin with the enemy is giving gasoline-powered models more of a boost than harm. That is if you look at it the way the storekeeper did when strikers were picketing his store. He remarked, "I don't care how much you picket my store but be sure to spell my name right on those signs." Here in Atlanta before the well known editorials were published there were less than twenty gas jobs and now there are over thirty-five and more are being made. A large number of people have come to me since the editorials started and started asking questions as to how they were made and the methods of controlling the models in the air. All these people were people who had seen me flying one at some time or another and had a spark of interest in the subject. The largest element of builders here in Atlanta are professional men and treat the hobby with as much time, study and money as anyone else does with the hobby that they follow.

"In the three years that gasoline-powered models have been in and around Atlanta there has been no damage to any one's property or to any person. In fact all the model builders think enough of their models not to try to see how much damage they can do to the other fellow's property. Last summer and so far this summer there have been over a dozen people injured with batted baseballs and several automobiles damaged with batted baseballs.

"I firmly believe that any educator who has thought about the subject will tell you that it is much better for a person to spend his time at some educational hobby than to spend his time in the street. This person who spends his time becoming an expert in some field of endeavor is a much finer and loyal citizen than the person who attempts to see how fast his V-8 will do in second. I know that I am not going to risk a $21.50 motor and $7.50 to $50.00 worth of material along with forty to one hundred hours of work on a model just to see how much damage I can do to someone else's property and I feel that others feel the same way.

"The greatest item that the exponents of the prohibition idea have overlooked is the fact that the greatest developments in any scientific field have been made by amateurs. Gasoline-powered model planes are now beginning to be developed to the state where they can be used for experimentation of new designs and developments."

Mr. Albert Lewis has written a very fine open letter to the state aviation inspector of Massachusetts. Following are several interesting quotations from this letter.

"The apparent need for restrictions in

gas model flying has already been met by those who encourage and sponsor the hobby. It is understood that the National Aeronautic Association will issue shortly licenses for gas model builders for which modelers will pledge to fly their ships only at the discretion of their group leader, airport manager, field owner, or state aviation inspector.

"With thousands and thousands of gas builders participating in the work the country over and the world over, it is not to be forgotten that their efforts may give the aviation industry many new aids towards safer and more efficient airplanes.

"Russia is preparing to give thousands of miniature gas engines to its model builders for experimentation in gas models, according to press reports emanating from that country. France, Italy, and Great Britain are already vieing with the United States for supremacy in the gas model field. Canadian records in almost every instance are comparable with those of the United States.

"Are American men, women, boys and girls to be hindered in their creditable work in that field of junior aeronautics devoted to the building and flying of miniature gasoline engine powered model airplanes, Mr. Hodge?

"The Boston Gas Model Society does not believe so. Massachusetts with its flying National Guard, its expansive airport program, and its desire to create air-mindedness in its youth certainly won't stifle one of the newest, safest and most educational forms of aviation activity which ever swept the nation.

"How about it, Mr. Hodge?"

From Mr. Roy Messenger of 317 Helen Street, Linden, New Jersey, who is president of the Linden Model Airplane Club, Unit 58 of the I.G.M.A.A., we have the following comments:

"The arguments brought up against gas models are silly to say the least and we hardly can believe they come from anybody of reputed intelligence.

"At a recent meet held in New York City we saw something that far exceeds gas flying in regard to danger. We saw young model builders trailing their planes through the busy streets of the city, dodging taxies and cars and at the same time trying to keep their plane in sight. I wonder what our 'enemies' would have to say in answer to this?

"My motto is, 'A man who knows nothing about something shouldn't try to do something about nothing.'"

From Mr. Don Wilson, who is now in the Good Samaritan Hospital of Dayton, Ohio, not because of any gas model activities but for other causes, we hear the following:

"The recent news of the heinous and rather ambiguous movement to abolish gas motors has left a bad taste in my mouth and I feel inclined to say something about it.

"As we all know, model aviation is a motivater of full scale aerodynamics and is really vitally important. Gas motors have created a new interest in this popular hobby and have definitely elimimated the erroneous idea that it is a simple and childish pastime, as the public is sometimes wont to believe. This alone caused many older people to give in to a suppressed desire to get out and try some pet idea manifested in a plane that has been a secret for months on end.

"A lot of ambitious boys are kept out of mischief and given hours of pleasure doing something that most certainly is not as bad or dangerous as some things they would do if they were not occupied.

"Before the advent of gas motors model plane building was getting rather humdrum because it was getting more difficult to attain anything unusual in duration or design and contests were more for the younger boys because of the age limits. Now there are contests for all ages and gas motors give an entirely new field to work in. A new industry is brought to life and new jobs are created. What could be more desirable?

"The average person has a propensity to organize and compete homogeneously, and when a few model builders get together they're bound to form some kind of an association that will promote friendliness, stimulate new ideas and bring out the best that's in every one of them.

"Abolish gas models? The idea is just as atrocious as the arguments being used to instigate the movement. The only thing I can't understand is why chess, checkers and jacks have been overlooked. A lot more notoriety is in the offing for any designing individuals who care to start a campaign against these highly dangerous bans."

Mr. E. Schaffhanser of 1520 Liberty Street, Allentown, Pa., writes:

"It might interest you to know that when the announcement against gas models was made one of the co-managers of the local airport called me up and wanted to know if there would be any danger of banning these models. His name is Wilfred Post, Jr., and is greatly interested in this type model and will permit gas contests at the airport nearly every day, including Sunday."

It appears that this airport manager is afraid gas models will be banned. In fact, many airport managers consider the flying of miniature gas models a great attraction which helps to advertise flying in a most unique manner.

Mr. Mark Kert of 204 West 88 Street, New York City, writes:

"To me gas models are the kindling wood that keeps the home fires burning. They, in a large measure, are preparing me for a future in aviation. I have only built one but I can appreciate their value greatly."

Mr. Leo Rutledge, who is State Director of the I.G.M.A.A. in Kansas also writes us. He has been a newspaperman and active in boys' work for a number of years. He is thoroughly familiar also with gas models. He comments as follows in his letter:

"Recently there has been much adverse criticism directed against one of the cleanest and most enjoyable pastimes for boys, model airplane work as concerns gas models.

"In Wichita and in all other vicinities with which I am familiar, the gas models are flown under the supervision of someone who is familiar with and capable of carrying out this sort of program with every precaution. The gas jobs are not flown in congested districts, nor when

planes are either taking off or landing at an airport. In fact the TWA and Brainiff officials whom I know have shown a great deal of interest in our work, and have helped us by giving advice and all possible cooperation at all times.

"Mr. Walter Beech, local airplane manufacturer, has allotted us space in which to hold our trials at his airport. One engineer at Stearman Aircraft Co. located here, remarked that it would be a poor pilot who wouldn't see one of the models and it's certainly not going to run a plane down from behind. Unless this undue criticism is answered and argued it is liable to result in the government restricting gas model airplanes so rigidly that it will discourage the work altogether.

"I sincerely hope that every model airplane enthusiast, old and young, who is interested in the future of gas model building, will take it upon himself personally to bring the true facts before his congressman, senator, aviation official, or any other citizen who would like to keep unfair legislation from being passed. Let's all work together to see this thing through."

Here is a letter from Fred Bellows of 137 Orange Street, Roslindale, Mass., who appears to be doing a bit of education of his own. In this case his parents are the pupils. It seems that now it is young men who are educating their parents in many ways. He says:

"I have a little story to tell. At about the time that this drive to suppress gas models started I had just accumulated eleven dollars and had announced my intentions of buying a gas motor to my parents. As we get a Boston newspaper that carries the adverse propaganda, my father and mother both read that stupid article downing gas jobs. A bitter argument ensued in which I emerged victor, with a couple of skeptical but convinced parents. Thus my modeling career (?) and my chances in aeronautics were almost cut short."

Mr. Robert E. Alexander of 1848 C Street, Lincoln, Nebraska, one of our gas model forces, has just directed a letter to the commander of the opposing forces. It is phrased as follows:

"It hardly seems possible that any organization supposedly existing for the purpose of furthering "The Interests of American Youth in Aviation," could sponsor a so-called 'safety' campaign against gasoline-powered model airplanes. How can you come to the conclusion that gasoline model activity is detrimental and dangerous to the extent that you term it as being 'a menace to life and property'? How can it be said that this activity is of such an ill-favored nature that it should be abolished?

"It may be that activity of this sort is not advisable among young persons who might not appreciate or understand the potentialities of small, gasoline motors and gasoline-powered models. On the other hand, this activity among the ranks of young men is proving and will prove to be an invaluable stepping-stone from the stage of model building today to the stage and position of aeronautical engineering and piloting of tomorrow. Certainly, it must be recognized that the large gasoline model contest of late date have incorporated organization of a high and efficient type. Any danger that might be present has certainly been reduced to a minimum in these cases. Furthermore, apart from contest activity, gasoline model building, when carried on individually by young men of serious purpose, certainly shows no indications of being dangerous to anywhere near that point at which a menace to 'life and property' is created. The very use of the word 'menace' implies either gross exaggeration or lack of thought and seriousness of purpose. It is true that unavoidable accidents may happen, but this fact applies to aviation itself—as well as any other field of mechanical endeavor.

"All-in-all, the excuse offered for this 'safety' campaign would certainly seem to be entirely unassociated with any true spirit of progressiveness or interest in the future of aviation. If this campaign were carried on with the purpose of *limiting* gasoline-powered model activity to those of a certain age of maturity, then it would seem that it was backed with some thought and genuine concern. As it is, it is difficult to believe that the campaign could receive the endorsement of anyone acquainted with gasoline model activity and truly and sincerely 'Devoted to The Interests of American Youth in Aviation.' Also, it seems only logical to suppose that those interested in gasoline model activity and even intelligent, impartial observers of the activity at large, will await conclusive proof that the activity does constitute a menace before recognizing any campaign of this as anything but a foolish scheme founded on ignorance. In other words, how many persons have been injured and how much property has been destroyed because of the menace of gasoline-powered models?

"The sponsors of this campaign as well as myself might obtain some enlightenment through the publishing of this letter in your columns."

Any comments that readers may have on this situation will be most welcome. Please mail them to the I.G.M.A.A., MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. We ask all readers to note the coupon which appears on page 59. If they wish to lend their support to the gas model movement and help prevent the banning of this fine sport we request that they fill in, sign and return this coupon to I.G.M.A.A. headquarters, at the above address.

Now we have a few interesting pictures which have been contributed. The first one shows an excellent flying picture of a modified KG. This was built by Bill Barker of 859 Contra Costa, Berkeley, Calif. He says:

"I have added a cabin and used large hollow spars. It is built to ¾ scale, being six feet in wing span. To date it has made about 120 flights and survived some remarkable crashes in its year of operation. It weighs three pounds complete and flies very fast with great stability."

Mr. Barker also sends us another picture which we have been unable to print. It is one of his other ships, of which he says:

"This ship has lots of dihedral, low center of gravity and still won't stay in level flight. Could you tell me what is wrong?"

After studying the picture carefully it appears that the line of thrust is very low and the center of lateral area is quite high. Obviously this is the answer to the difficulty.

Here we have a surprise for a number of our readers. In picture No. 2 is shown the beautiful perpetual trophy to be given at every National contest as an award for radio-controlled gas model flying. This trophy is given by MODEL AIRPLANE NEWS. It was presented for the first time at the 1937 contest and was awarded to Chester Lanzo of Cleveland, Ohio. He will hold it for a year and will pass it on to the next winner, unless he wins it again himself. The trophy is 33 inches high, which will give you some idea of its size.

Maxwell Bassett of Philadelphia, Pa., is a consistent winner, which indicates the thorough understanding of gas model flying. Picture No. 3 shows him receiving the Gar Wood Trophy from Major James Doolittle, of the Shell Oil Company. Bassett received this trophy for making a flight of over 70 minutes in the open event. His

model was lost. However we have heard recently that it was found 25 miles from the Detroit River, in Canada. This makes a flight of approximately 50 miles from the airport.

Picture No. 4 shows Franklin H. Dewey Jr., of Grosse Pointe Shores, Michigan, with his plane, a Buccaneer, which he entered in the National contest at Detroit.

A beautiful job of high aerodynamic efficiency is shown in picture No. 5. It is a nine-foot streamline job designed and built by Robert Jeffery of Findlay, Ohio. The streamlining effect is due to Jeffery's experience in speed model building. He is one of the speed model experts of America. The machine is of balsa construction; fuselage, wings and tail planes are also balsa covered. The whole model is painted glistening orange and black.

One of the unusual accomplishments of the year is credited to the father of Lawrence Reithmaier of 155 Street & Waverly Avenue, Oak Forest, Illinois. He has produced a little four cycle motor with a 6/7" bore and a ¾" stroke. It has an exhaust and an intake valve, rocker arms and pushrods. The valves are operated by three gears and two cams. It even has a real carburetor which is different from most of the motors. In it is incorporated a set jet and an adjustable air intake which makes it easier to adjust than the ordinary mixing valve type. The timer is located in back of the crankcase, which is unusual. It will run twice as long on the same amount of gas as a two cycle engine. No oil is mixed with the gas. The oil is put in the crankcase where it can't get all over the ship.

Picture No. 6 shows the model with the motor installed. The model itself is of exceedingly fine design from a stability and aerodynamic standpoint.

Picture No. 7 shows a close-up view of the motor installed in the plane.

Peter W. Westburg of 315 East Michigan Street, Michigan City, Indiana, sends us picture No. 8 which shows a very remarkable gas model. In building this ship he started out to build a plane which would look like a real ship. Its similarity to a Douglas Observation plane may be noticed. Though only 65 inches in wing span it weighs 4½ pounds completely loaded with gas and batteries. Due to its excessive weight Westburg had doubts as to its flying capacity. However, he tells us that it got off the ground with great ease and flew for about fifteen minutes. At the end of this time one of the wings came off, at about a 700 ft. altitude. Later the airplane was found injured to a very small extent in a swamp. The wing had landed ¼ mile from this spot. He says it will soon be in commission again.

A great deal of thought has been given to the application of single-bladed propellers to gas jobs. Mr. W. R. McNeil of 419 South Main, Barbourville, Kentucky, sends us picture No. 9, which shows the propeller of this type which he has mounted on one of his planes. He says the plane takes off a little more slowly than with a two-bladed prop but it flies faster in the air. There is no vibration at any speed.

May your editor make a suggestion? When equipping your plane with a single-bladed propeller, do not merely cut off one blade from a propeller which flies your plane properly. A special one-bladed propeller should be designed, the area of which blade is from 75% to 100% of the area of the two blades of the double-bladed prop. Unless this is done the greatest efficiency will not be developed. Usually under these conditions model builders make their propellers with too high a pitch. It is suggested that on such propellers a pitch of not over nine inches be used.

Don G. McLeod, secretary-treasurer of the Model Aeronautical Research Bureau of Winnipeg, Manitoba, Canada, sends us picture No. 10, which shows a very unusual ship he has built. He says it flew directly off the drawing board and had eighteen flights with only one adjustment. On the nineteenth, his first official one, the plane took off at about sixty miles per hour (he says this was checked by figures) with the Brown wide open. The engine quit at 2000 feet and from there the thermals took her for a ride and so good old B-1067 passed away. The center of gravity of the ship is just below the thrust line and the directional center just above it. The dihedral is 10½ inches; stabilizer area, 30%; rudder area approximately 7%. It is powered with an inverted Brown engine which allows very fine streamlining. The glide was approximately 20 to 1.

Mr. Jack Schwartz of 1742 North Peach Street, Philadelphia, Pa., is now in charge of the Philadelphia Gas Model Association, Unit 6 of the I.G.M.A.A. in the absence of Mr. Bieberman, who is touring Europe. He says:

"All that I have at present in the line of news are the results of ground tests of my 'autogiro.' The tests are favorable. The span of the rotors is 7 feet and it is Brown engine-powered. The three rotors have as much lift as an ordinary nine or ten foot model. The rotor hub details are as yet a secret.

I, the undersigned condemn the program to ban the flying of gas models as unnecessary, unpatriotic and against the welfare and aeronautical education of Americans.

Signature .....

Address .....

.....

Occupation ..... Age .....

(Cut out and mail to I.G.M.A.A., MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.)

"The P.G.M.A. expects to hold a few meets during the next few months and a large intersectional meet in the fall."

We have a very interesting letter from Mr. Felix LaVallee of Hugo, Minnesota. He writes as follows:

"This radio-controlled plane has made successful flights while under control of an operator on land. Tests have proven definitely that controlling gas-powered model planes by means of radio equipment is entirely practical. Changes in the size of the control surfaces will have to be made as tests have revealed that they are too large. Something on the order of tabs is all the movable area necessary. The motor can also be stopped by radio.

"Building a radio-controlled model aeroplane requires considerable technical knowledge of radio. A license from the federal government is absolutely necessary to operate any form of radio transmitter.

"Specifications of the aeroplane: Power, Forster Brothers engine; wing-spread, 9 feet; weight complete with controlling apparatus, 11½ lbs.; radio receiver in plane, special design, 3 tube, 5 meter wave; complete weight of controlling apparatus in plane, receiver, batteries, relays, etc., 5 lbs.

When we first saw picture No. 12 we thought we were very much in need of glasses. However, upon closer examination we realized it is a clipped wing gas job. This is the work of John Jay of 1117 South Washington, Denver, Colorado. He says that this is a speed model of his own design. To date it has made five flights at a speed of from 60 to 70 miles per hour. The span is only thirty inches. It is powered with a Brown. On some occasions it has climbed vertically when the tabs on the stabilizer were up too much.

NOTICES

Mr. A. F. Hoeflich of 626 16th Avenue, San Francisco, Calif., says that the San Francisco Recreation Commission will hold a gas model contest in October.

Following are the results of a recent Philadelphia contest—the results of a Gas Model Meet, held July 10, 1937, at Northeast Airport, Red Lion Road, Philadelphia, Pa., sponsored by the Quaker City Gas Model Club, officially sanctioned by the I.G.M.A.A. and the N.A.A.:

Jack Conine, "Red Zephyr," Brown Jr., first, 16 min., 59⅘ sec.; J. W. Robbins, "Quaker," Brown Jr., second, 1 min., 57 sec.; E. Godshall, "Own Design," Brown Jr., third, 1 min., 55 sec.; Chas. Bossi, "Own Design," Brown Jr., fourth, 1 min., 53⅘ sec.

There were twenty-three entries, fuel allowance 1/28 oz. per pound. A beautiful ribbon was awarded the first four places, and a pair of 4½" streamlined wheels was awarded to Jack Conine, additional for first place.

Air Ways

(Continued from page 35)

award of $2, were won by the following young men. Their names appear in the order in which they placed:

Alex R. Johnson, 7949 Avalon Avenue, Chicago, Illinois; George Huggins, 1222 South 5 Street, Terre Haute, Indiana; Robert Platt, Bolling Field, Washington, D.C.; Bark Bow, 15929 Euclid Avenue, East Cleveland, Ohio; P. C. Woodward, 5618 St. Dominique, Montreal, Canada; Stanley Clurman, 1515 48th Street, Brooklyn, New York.

We hope that all those who entered this contest received some joy and benefit from their participation. They can look forward in the near future to another interesting contest on design. Notice of this will appear later.

We have several contributions from Air Ways Club members which we wish to tell you about. Our heading for this month was created by Henry Clark of 76 Fort Washington Avenue, New York City. It is a very clever sketch of Al Williams' Grumman G.G.-2. Clark is a newcomer to our artists' division in Air Ways.

An excellent scale model of a Boeing P-12 E, built to 1/56th full size, is shown in Picture No. 1. From the picture it gives the appearance of a large size ship. Actually, however, it has an approximate span of six inches. The wheels are one and a half inches in diameter. The fuselage and wings are of wood, tail surfaces are sheet brass. The struts and flying wires are steel wire. The cowl was built up by hand from heavy brass tubing and the engine was cast in lead from a home-made pattern by its builder, J. Bloom of 8 Hartwell Street, Roxbury, Mass. The wheels were also cast in lead from a home-made mold. The propeller was hammered from aluminum and spins freely on a balanced shaft.

We feel the picture does not do this model justice inasmuch as the methods of construction are very unique. These of course do not show in any creation. The result is at least exceedingly fine.

Kenneth Darlin of Tinley Park, Illinois, has us guessing. He sends us picture No. 2 and says that it is a picture of a model Waco military plane in China. This is all the detail he gives concerning it. After studying the matter carefully we wonder if he means that this is a Waco plane of a military model. In other words, is it a model or is it a big ship? We have to take his word for it that it is in China. Can anyone solve this riddle? If it is a model, it is an exceedingly fine job and posed in a realistic fashion. Apparently it is a Waco military job just coming in for a landing.

Perhaps some of our older readers who have been reading MODEL AIRPLANE NEWS for a number of years will recognize the model in picture No. 3. Plans for it appeared in the magazine some time ago under the name of the "Flying Fool." It was sent to us by Alfred Johnson, Jr., of 1030 Delaware Street, Berkeley, Calif. He tells us it is a picture of a plane built by his father almost five years ago. It was an especially stable flier, and could perform many stunts for its size. One of its peculiarities was it would not spin under any conditions. He tells us that for its size it is the best performing model he has ever seen. The plane was designed and plans presented by Mr. Howard McEntee in 1932.

MODEL NEWS FROM OTHER COUNTRIES

Malaya

Next we have a picture all the way from Malaya. This was sent to us by K. P. Khoo of 16, c Bukit Bintang Road, Kuala Lumpur, Malaya, F.M.S., who is shown in picture No. 4 with the twin motor hydro he has built. He gives no details concerning it. However the picture indicates that the design is most original and it should perform exceedingly well.

Philippine Islands

Picture No. 5 comes from Jose Q. Jimemez, who is assistant group leader of the Philippine School of Arts and Trades, San Marcelino Street, Manila, P. I. The picture shows members of the Hobby Club of this organization. Left to right, they are: Jose Jimemez, Miguel Cotreras, (Leader), Patrocinio Catuncan Jr., M. Gregorio Sevilla, Supt, of Schools, Jose San Mateo. From examination of the machines built by these young men we would say that they have progressed far from the novice stage. They are very well

designed and we hear from Mr. Jimemez that remarkable flights have been made in spite of the fact that the intense heat in the Philippines has a very bad effect upon rubber motors.

Denmark

For the first time MODEL AIRPLANE NEWS publishes news of model activities in Denmark. Mr. Per Weishaupt has written us from Torkel Badens Vej 12, Helrup, Denmark. He says:

"Due to the small size of the country there is not much aviation in Denmark. Our national air transport company, though the oldest of the existing companies in the world, has not more than six airplanes, of which five are obsolete. Only a single internal airline is working. Therefore model aviation is the only part of aviation really progressing here and it is the only way to make Danes airminded today."

May we state here that this is not the only country today in which model aviation is playing a large part. Such countries as Russia, Germany and Italy have made model aviation a compulsory study in the schools in order to insure a fundamental training in aviation matters and aeronautic theory among their young men. It appears that the United States government and educators in America are not far seeing and wise enough to use this as a universal medium of educating American young men. At the present time only a few individuals who have the vision to see this point are carrying on to make model building in America a great educational force. The most unfortunate part of this is that usually the only remuneration that these men receive, is worth while accomplishment.

Mr. Weishaupt of Torkel Badens VFJ-12, Hellerup, Denmark, sends us picture No. 6 which shows a group of members of the "Odense Model-Flyveklub". Among the models shown are a Grosse Winkler, first from the left; a Strolch, third from the left; and a Knirps, second from the right. We have reecived several other photos which we are unable to print here but which will appear in later issues.

New Zealand

We hear from W. B. Mackley of 8 Ascott Avenue, Remuera, S.E. 2, Auckland, New Zealand, club captain of the Auckland Model Aero Club. He sends us picture No. 7 showing one of his hydros which weighs 5½ ounces. He says:

"Hydro flying is quite a pastime in this country and many high times are made with such ships."

Boys of this club must have the building of hydros down to a science inasmuch as Mr. Mackley says that he flies all of his ships with many duckings received during operations. In spite of this many high hydro times are made. One ducking evidently does not put the model out of commission. In order to attain such results the model must be practically watertight.

Russia

Picture No. 8 shows a young Soviet model builder with one of his ships which he is about to launch into flight. From the picture you may get a general idea of the type of models being flown in this country.

Australia

We hear from Mr. Sid Wigzell of 101 Birriga Road, Woollahra, Sydney, Australia. He sends us a detailed account of activities but due to its length we can only print part of it here. The rest will appear in the near future. He says:

"The Bondi Black Hawks, which is the oldest model aeroplane club in Australia, was founded by Sid Wigzell in November 1929. This club has won many model contests of importance in Australia. I am sending a list of club records, many of which are official Australian records. Stick models, hand launched, 14 min. 43 sec. (30" wingspan)

R.O.G. 6 min. 41 sec.

R.O.W. 1 min. 49¾ sec. (18" wingspan.)

"The R.O.W. was using a float designed by a member of this club, which float is now used by most model builders in Australia. It consists of an inverted wing section with a curved step instead of a flat step. The flat step was found to stick holding the models to the water too long.

"More records are:

Fuselage models, R.O.G. 10 min. 28 2/5 sec.

Fuselage models, hand launched; 21 min. 49 sec. These were 30" in wing span, Wakefield formula but not weight rule models.

Wakefield weight rule of four ounces, R.O.G.; 15 min. 20 2/5 sec.

Scale models, hand launched; 2 min. 4 1/5 sec. This was with a 30" model, DeHavilland 53.

R.O.G.; 1 min. 7 1/5 sec. with a D.H. 53.

The D.H. 53, Fairchild 22, Curtiss Thrush and Stinson Junior are the most successful scale models here.

"Jim Fullarton is our most successful flier, having won the Champion of Champions Contest to decide the best flier in Australia. The contest consisted of stick model, R.O.G., R.O.W. and H.L. fuselage models; R.O.W., R.O.G., and H.L. scale models; R.O.G., R.O.W., H. L. and speed models over 100 yds. Jim also placed tenth in the Wakefield contest in England in 1935.

"Our speed times are 100 ft. in 1¾ sec. and 100 yd. in 7 sec. made with fuselage models."

Mr. J. E. Stewart of Ewing House, 130 Adelaide Street, Brisbane, Queensland, who is honorable secretary of the Junior Birdmen of Australia, also writes us and sends news of activities in Australia. This organization has no connection whatsoever with the organization of the same name established in America. Mr. Stewart says:

"This new organization was inaugurated in November, 1936, by a part of model airplane enthusiasts and has become so popular that the membership is steadily growing, with every prospect for a bright future.

"In a few weeks time it is the intention of the association to commence classes for teaching boys how to build and fly model aeroplanes. By so doing it is our hope that it will encourage them to become airminded.

"Many trophies have been presented to the association by prominent men in Brisbane. A big trophy shield is also in the

course of being manufactured and is to be donated by the president.

"Up to the present time the association has held several contests. A few of the records are as follows:

R.O.G. outdoor fuselage, 5 min. 25 2/5 sec., out of sight, by C. Townsend for the seniors.

Junior H.L. fuselage, 1 min. 28 sec., by Ray Gustavson, age 9 years.

Wakefield Type, 2 min. 16 1/5 sec., by P. E. Gustavson.

H.L. indoor stick, 3 min. 24 3/5 sec., by J. E. Stewart.

"Townsend's model was taken from plans on page 8 of the June 1936 issue of MODEL AIRPLANE NEWS.

"The weather at this time of the year is not conducive to good flying, hence the lowness of the times recorded. For indoor flying we have the use of the City Hall which has a diameter of 100 ft. and about 100 ft. in height.

"During the present year we hope to have intercity contests from other districts of Queensland and New South Wales.

"The personnel of the Junior Birdmen of Australia consists of:

"Patron, Sir Leslie Wilson, State Governor of Queensland; President, James Stewart; Vice Chairman, C. C. Phillips; Hon. Secretary, J. E. Stewart; Hon. Assistant Secretary, A. Nielsen; Hon. Treasurer, C. G. Thomsen; Hon. Recorder, F. Kemble."

CLUB NEWS

Indiana

Mr. Herbert M. Kennedy of "The Anderson Daily Bulletin," Anderson, Indiana, writes and tells us that his club recently held a very successful contest at the Athletic Park of Anderson. Edgar Dilts of 2429 East Lynn Street was first in the senior high class and Ervin Milhon, 238 Haverhill Drive, won the junior high class event. The contest was sponsored by the "Bulletin." Picture No. 9 shows a group of the contestants who took part.

Pennsylvania

Mr. Harry G. Vogler Jr. of 4412 Butler Street, Pittsburgh, Pa., who is director of the aircraft division of the National Youth Administration of this city, has sent us a resume of the activities of the glider club.

The newly formed Glider Club of the Boys Club of Pittsburgh, has been made possible through the cooperation of the Works Progress Administration of the Pittsburgh district, in that the instructors have been furnished by this agency. The group is made up of a cosmopolitan group of youths, who are also members of the Boys Club of Pittsburgh.

The Boys Club of Pittsburgh, is the only affiliate of the Boys Clubs of America, Inc. to have in its grouping, a Glider Club that hopes to gain for its members a national recognition, from the Soaring Society of America, and also to gain for its members the coveted Glider's Pilot License as issued by the Bureau of Air Commerce of the Department of Commerce, in Washington.

The group has, through the efforts of the director of what is known as the Aircraft Division of the Boys Club, secured a Northrop Primary Training Glider, and these youths, under the guidance of Mr. Vogler, are overhauling the ship, and recovering the glider lift and control surfaces throughout.

The ship is being thoroughly gone over under the watchful supervision of Mr. Vogler, and the members all are very much interested in the craft and its construction. The group is made up of twenty-five of the more enthusiastic aeronautic fans, who have been in the model division of the aircraft division of the Boys Club.

This group of youths, under Mr. Vogler, have started in the field from the actual ground floor, learning the parts, nomenclature and theory of flight under this able instructor, and by means of model construction have shown their interest and aptitude in the aircraft construction field. These boys have all decided that if it might be possible in later life the aircraft manufacturing industry or some phase of its development shall be their life vocation. These youths are doing their best to fit themselves into this work, by diligent study of the art of aviation, and by the application of these fundamental principles as laid down in these classes at the Boys Club of Pittsburgh.

In the past eighteen months, the aircraft division of the Boys Club of Pittsburgh has sprung, by leaps and bounds, from a meager few until at this writing there are over one hundred and twenty interested participants. Of this total, the select few are of the Glider Club, and their places are being looked forward to be usurped by a number of younger ambitious enthusiasts.

Iowa

We have received the following announcement from Wallace R. Blake of Marshalltown, Iowa. It is as follows:

Announcement

From October 4-9 inclusive the Ace Model Club is holding a scale model contest. Solid scale, flying scale, built-up true-detail, and a prize for the best constructed gas job. Scale gas jobs will not have any better chance than any other gas job.

The annual Tallcorn Exposition is going to be in full swing at that time. This contest may be a featured part of the Exposition. At any rate it will receive quite a bit of notice, because people from all over the United States will be here.

Any model builder may enter. Any one interested should get in touch with the Ace Model Club as soon as possible.

In talking with an official of the Tallcorn Exposition he expressed his desire to have a model contest on Main Street. He is to talk with the committee and we will soon know definitely. If we do have such a contest in connection with the scale contest we will probably use R. O. G.s and small fuselage models of the indoor type.

All correspondence should be sent to the Ace Model Club, 19 South Center St., Marshalltown, Iowa. We are anxious to hear from and get in touch with all the model builders in the state.

Results of the 1938 Ace Model Club Air Race:

SENIOR DIVISION

1st—Ernest Grûwell, 16, Ft. Des Moines, Iowa 2.59
2nd—Tom Ray, 20, Des Moines, Iowa 1.32 8/10
3rd—James Clemens, 17, Marshalltown, Iowa ..... .36

JUNIOR DIVISION

1st—Daryle Messner, 15, Des Moines, Iowa ..... .49
2nd—Kenneth Joss, 13, Ft. Des Moines, Iowa ..... .46
3rd—David Tyrell, 15, Marshalltown, Iowa ..... .43

NOTICES

Several young men have written us asking for information on the set-up of their workshop and how to operate their machines. Information on this subject will be sent to anyone who writes the South Bend Lathe Works, South Bend, Indiana.

Pennsylvania

Leaders in the field of aeronautics and civic affairs paid tribute to the Philadelphia boy fliers at the P. M. A. A. dinner held at the Poor Richard Club in Philadelphia on June 23, 1937. The dinner climaxed the activities of eight P. M. A. A. seasons.

Mr. Percy Pierce, toastmaster, introduced Mr. Henry Butler Allen, Secretary and director of the Franklin Institute, who praised the work of the P. M. A. A. and presented medals to the following winners of the Joint Franklin Institute—P. M. A. A. Scale Model Building Contest:

Norman F. Beyer, 18, 5911 Camac Street, Philadelphia, Pa.

Charles Ireland, 17, 4814 Darrah Street, Philadelphia, Pa.

Albert B. Ely, 17, 8440 High School Road, Elkins Park, Pa.

Other speakers of the evening were: Mr. Widermann of the Philadelphia Evening Bulletin, Mr. John S. Kean, President of the Aircrafters, and Mr. Nelson Johnson of the Aircrafters, Mr. Kern Dodge, former President of the Aero Club of Pennsylvania, C. Townsend Ludington, Mr. Dickel, of the Rising Sun Aircraft School, Mr. Charles H. English, Executive Secretary of the Playground Assn. of Philadelphia, Mr. Ralph H. McClarren, Secretary of the Aero Club, and Mr. Victor R. Fritz, P. M. A. A. Field Director who helped in presenting the following awards:

FLYING STICK MODELS

Season Chapter Trophies:
Northeast, 62 points
Caterpillars, 47 points
McKinley Recreation Center, 42 points

Season high point scorers:

Seniors:
Walter Lees, Caterpillars, 48 points
Sidney Grodsky, Condors, 43 points
Robert Gimbel, McKinley, 39 points
Robert Jacobsen, Northeast, 35 points

Juniors:
Robert Reinish, Northeast, 49 points
David Call, Northeast, 43 points
Herman Mitchell, Northeast, 41 points
Arthur Koslow, Northeast, 37 points

Indoor Championship Medalists:

Seniors:
William Wert, Caterpillars
Charles Heintz, Caterpillars
Walter Lees, Caterpillars
Edward Manulkin, Northeast
Robert Jacobsen, Northeast
Robert Lewis, Northeast
Arnold Cohen, Northeast
Ervin Leshner, Northeast
Robert Gimbel, McKinley
William Sharp, McKinley
Henry Tucker, Fitzsimons Jr. High
David Conrad, Audenried Jr. High
George Micott, Flying Keystone, Allentown.

Juniors:
David Call, Northeast
Herman Mitchell, Northeast
Robert Reinish, Northeast
Arthur Koslow, Northeast
William Hawks, Northeast
Philip Klasky, Condors
Milton Garber, Condors
Robert Schimpf, McKinley
Alan Bertram, McKinley
Daniel Cancelli, Audenried Jr. High

Outdoor Championship Medalists:

Seniors:
Charles Sclight, McKinley
William Sharp, McKinley
Robert Gimbel, McKinley
Walter Lees, Caterpillars
Frank Sheppard, Caterpillars
William Wert, Caterpillars
Herman Mitchell, Northeast
Ervin Leshner, Northeast

Juniors:
David Call, Northeast
Robert Reinish, Northeast
Robert Schimpf, McKinley
Paul Blackman, Cooke Jr. High
Wm. Hewson, Golden Eagles
Lenard Foti, Audenried Jr. High
William Ree, Condors

FLYING SCALE MODELS

Season Chapter Trophy:
Olney High School, 27 points

Season High Point Scorers:

Seniors:
Charles Janton, Central High School, 27 points
Lee Laubenstein, Olney High School, 17 points
Douglass MacFadden, Olney High School, 15 points

Edward Deskiewicz, Pylon Phantoms, 9 points
Robert Gimbel, McKinley Recreation Center, 9 points
William Hibbert, Olney High School, 9 points

Juniors:

Walter Eggert, Pylon Phantoms, 17 points
Bernard Paul, Central High School, 15 points
Karl Oerth, Pylon Phantoms, 12 points
Conrad Grimes, Cometeers, 9 points

Championship Meet Winners:

Seniors:

Charles Janton, Central High School
Edward Deskiewicz, Pylon Phantoms
Douglass MacFadden, Olney High
William Hibbert, Olney High School

Juniors:

Walter Eggart, Pylon Phantoms
Karl Oerth, Pylon Phantoms
Jack Lit, Olney High School
Conrad Grimes, Cometeers

William R. Wert of 5380 Charles Street, Philadelphia, Pa., won the Anthony J. Drexel Biddle Cup for the second time, with a flight of 19' 48 4/10" made on the 1st of May. He is the only boy ever to capture the trophy twice.

Elmira Soaring Competition

Richard C. DuPont of Wilmington, Del., regained the American soaring championship with performances at the Eighth Annual National Soaring Contest. DuPont held the national crown in 1934 and 1935, but lost it in 1936 to Chester J. Decker of Glen Rock, N. J. The new champion will hold the Edward S. Evans Trophy for one year.

DuPont earned 179 points in general competition and was awarded three additional points for a pioneer flight into a thunderstorm. Decker and Emil A. Lecheka of Long Island City, N. Y., were tied for second place with 178 points. Decker received 175 points in general competition and three for special performances while Lecheka received 173 in the general rating and five for pioneer work.

Far out in front of the American pilots but not eligible for the championship because he is a German citizen, was Peter Riedel, one of the three foreign entries in the meet. He earned 186 points in general competition and was awarded 10 special points for his initiative in taking the lead on cross-country flights.

Connecticut

Alfred W. Schmidt of 29 Vernon Street, Hartford, Conn., chairman of the Model Aero Engineers of Hartford Club, sends us the following:

The First Annual City Model Airplane Meet sponsored by the Amusement Committee of the Board of Aldermen and the Aviation Committee in conjunction with the WPA Recreation Division of the Hartford Park Department, was held on July 5 at Brainard Field, Hartford. The meet was conducted by the Model Aero Engineers of Hartford. There were forty contestants entered in the one event which was hand launched flying scale models with a crowd of 750 watching. The prizes were handed out by Alderman John Fay of the Amusement Committee.

The prize winners were as follows:

Senior Group

1st—Edward Rosen	147.75 pts.
2nd—Edwin Goral	129.50 pts.
3rd—Bernie Banowich	121.50 pts.
4th—Raymond Rosen	109.50 pts.

Junior Group

1st—Frank Lattanzio	140.50 pts.
2nd—D. Varley	113.04 pts.
3rd—William Zaleski	109.25 pts.
4th—Charles Downey	107.08 pts.

The first prize winner received a silver trophy, second prize a gold medal, third prize a silver medal, and fourth prize winner an airplane ride. Duplicate prizes were given in the junior and senior classes.

Fred Bull was contest director, Alfred W. Schmidt was assistant contest director and the other judges were as follows: Medos J. Palshaw, Chester Ehman, James Grant, Paul Schmidt, Arthur Benoit, D. Allen Seymour and Edward Brant.

In this meet the Model Aero Engineers of Hartford obtained seven places out of eight. Counting the fourteen places of a possible eighteen obtained by us in the Ninth Annual State Meet makes our total 21 places out of a possible 26 in the two meets entered in since our organization was organized in September, 1936.

New York

Ben L. Davis of 175 Beach 82 Street, Rockaway, New York, writes and asks the following:

"The Aviation Club of New Utrecht would appreciate hearing of ideas for novel contests which have been held by aviation clubs of other high schools. These ideas will be very beneficial to us. Please address all communications to Mr. B. Davis, 174 Beach 82 Street, Rockaway, New York."

Aviation Advisory Board

(Continued from page 37)

speeds during the many maneuvers it is required to execute. For instance, starting from "rest," the angle of attack is very large while when it is flying at high speed and moving forward the blades are passing through the air at a very small angle and if the plane could fly fast enough the blades would pass through the air at a negative angle and would deliver a thrust backward instead of forward. In other words, if a propeller is designed to give a plane an extremely high speed; that is, a maximum thrust when it is travelling at high speed, the blades would have an angle which is entirely too great when it is starting from rest and when it is climbing. During the latter two conditions it will act inefficiently. Obviously, therefore, it is advantageous to have a propeller, the blade angles of which may be changed to meet the various conditions encountered. When the airplane is taking off the blades are moved to a small angle; when the plane is climbing the blades are moved to a medium angle; at high speed the blades are given a high angle.

They are controlled from the cockpit by the pilot through means of an hydraulic mechanism located in the hub of the propeller. Some propellers use a mechanical means of operation, but this is not very common.

W. C. Drake, Jr., of 556 Ridgecrest Road, N.E., Atlanta, Georgia, has some questions concerning his gas model which may also be of interest to other readers. He says:

"I am thinking of redesigning my gas model. It is built from a small flying scale plan of a Curtiss Robin and has a six-foot wing span with a ten and one-half inch chord and is about forty-eight inches long. I plan to use either a Clark Y or Eiffel 400 wing section. I would appreciate your answers to the following questions, concerning this subject."

Question: Should the wing have any incidence? If so, approximately how much?

Answer: Yes. The angle of incidence of the wing should be approximately three degrees, not more; 2½ degrees probably would be better. By this we mean that the angle of the wing chord passing through the leading and trailing edge of the wing should be 2½ degrees positive to the line of thrust, irrespective of the center line of the fuselage or any other arbitrary base line which the model builder may choose to select.

Question: Approximately how much dihedral should the wing have?

Answer: We suggest that a dihedral of ¼ of an inch per foot of span be given to the wing. That is, each wing tip should be raised ¼ of an inch for every foot of wing span. However, the amount of dihedral required usually depends upon the type of ship upon which it is used. If the fin is large more dihedral should be used, if it is small less should be used.

The COMET GAS MODEL

. . . Soaring far above all others in

- **FLYABILITY**
- **COMPLETENESS and**
- **FINISHED PARTS**

It took us two years to test and perfect the Comet Gas Model—but when we read the enthusiastic letters of the fellows who have built them, we aren't a bit sorry! It's way out in front when it comes to FLYABILITY, COMPLETENESS, FINISHED PARTS, EASE OF CONSTRUCTION, and VALUE. You'll never know all the thrills of building and flying a real Gas Model until you get the Comet Gas Model Kit! Send 3c stamp for sheet containing complete specifications, features and list of contents, as well as many accessories in addition to those listed below!

SPECIFICATIONS

MODEL—Curtiss Robin
WINGSPAN—6 feet
OVERALL LENGTH—46"
WEIGHT OF MODEL—2 lbs. less motor
POWER—any 1/5th or 1/6th H.P. motor
WHEELS—3½ in. air wheels

A SENSATIONAL VALUE

$4.95 less airwheels and motor — **$6.50** with airwheels less motor

KIT—$2.50
BIG MONEY'S WORTH!

Postage—east of the Mississippi, 30c; west of the Mississippi, 50c; none if ordered from Comet Dealer.

Complete set of plans, all printed balsa sheets and die-cut ribs. Postage 20c; none if bought from dealer.

FEATURES: DETACHABLE wings and tail assembly. Wings "give" in event of collision, to protect them. ADJUSTABLE RUDDER and elevator setting. ADJUSTABLE MOTOR SKID accommodates practically every motor on market. Thrust line can be varied. SHOCK-ABSORBING LANDING gear and tail wheel—exclusive with Comet. Prolongs life of model by absorbing landing shocks. Monocoque type, used by newest transports, chosen because of light weight, structural strength, and ease of construction. CURTISS ROBIN chosen because of unusual inherent stability and excellent flyability. MOTOR SKID gives in event of collision—protecting motor. REMOVABLE COWL and hatches for easy accessibility to motor, battery and wing springs.

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COMET maintains distributors in many cities throughout the United States and other parts of the world. Foreign distributors include: F. P. Sweeten, Blackpool, England. R. W. Hill, Capetown, South Africa; E. J. Hyams and Son, Wellington, C. I., New Zealand; Swift Model Aircraft Co., Brisbane, Queensland, Australia. PACIFIC COAST DISTRIBUTOR: Edw. Kapitanoff, 4649 Prospect Ave., Los Angeles, Calif.

QUALITY GAS MODEL MOTORS & ACCESSORIES

GWIN-AEROMOTOR

Specifications: Flying weight complete with exception of battery, 12 oz. Bore, 13/16"—Stroke, 13/16". Speed range 500 to 7500 r.p.m. with design propeller. Power ⅛ h.p. Controllable spark adjustment. Price, complete with coil, tank, condenser, and instruction manual..... **$17.50**

BROWN JR. MOTOR

Everyone familiar with motors knows the splendid record the Brown Jr. enjoys. Years of experience lie behind this product. Its merits are known to gas model enthusiasts the world over. Specifications: ⅝" bore x 1" stroke. 1200 to 10,000 r.p.m. Total weight but without battery, 11½ oz. Complete as illustrated..... **$21.50**

TERMINAL SPRING CLIPS

Only ⅝" long. Very light, excellent for booster connections, terminals, etc. Bright nickel finish..... 2 for 5c

SENSATIONAL NEW SYNCRO ACE

A low priced, streamlined motor that's a real whiz! 1/5th H.P. motor; speed 500 to 10,000 r.p.m. Delco-Remy ignition. Champion spark plugs. Bore ⅞". Stroke 15/16". Improved timer, placed above oil and grime interference. Factory tested, mounted on skids. Less batteries and propeller..... **$15.00**

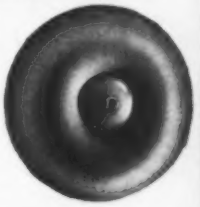
They're going fast. Order Now!

BURGESS BATTERY

Outlasts, delivers a hotter spark, and weighs 1½ oz. less than flashlight cells. Easier to install because it is one unit and has terminal clips. Instant starting without aid of "boosters." Moisture proof and leak-proof..... **80c ea.**

COMET AIR INFLATED BALLOON WHEELS

Will withstand the most severe punishment. Hubs are bronze bushed to fit ⅛" dia. axles. This prolongs life of wheels, makes them outlast many higher priced wheels. Hub is enameled, making a neat appearing unit. Pure rubber tires which maintain inflated pressure. Brings model down with a cushion-like action. 3½" dia. Only..... **$1.60 pr.**



NEW STREAMLINED INFLATED WHEELS

Inflated by use of simple valve furnished with each pair. Sturdily designed to give maximum service. You will be proud to put a pair on your model—they're wonderful. 3½" diameter $1.50 pair, 4½" Dia..... **$1.75 pr.**

IGNITION COIL

New light weight (only 2½ oz.) moulded extra strength bakelite enclosed coil. Clip terminals on primary and renewable high tension lead. Absolutely oil and waterproof. Coil is only 1" dia. and is 2" high. Will outlast many higher priced coils. A real classy looking unit. Coil, including high tension lead..... **$2.50 ea.**

CONDENSER

Can be used for any motor on market. Multiple strand leads. Mounting bracket attached to condenser **25c each**

FLIGHT TIMER

Adjustable from 0 to 60 seconds. Weighs only 2¼ oz. Silver contact on-off switch, snap action. A precision built unit. Will last a lifetime..... **$3.00 ea.**

ORDERING INSTRUCTIONS

Add to ALL orders an additional 15c to cover postage and packing charge. Remit by money orders only; you assume your own risk, if cash is sent. CANADA. Be sure to add an extra 15c in addition to the above. No postage charges if bought at your dealer.

LUGS

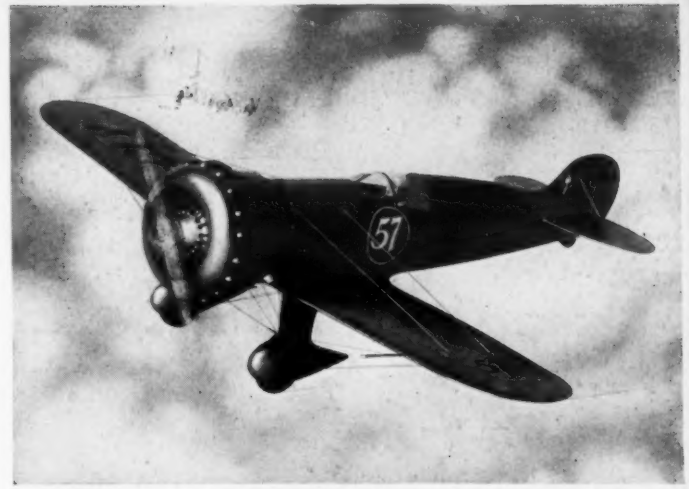
These should be soldered to all wire terminals. Facilitates taking connections apart. Smallest ever made. One-half dozen in package for 5c.

THOMPSON TROPHY WINNERS

Finest Racing Models Offered of the World's Most Famous High-Speed 'Planes. All C-D quality and class.

Build the Complete Lineup!

(1937 T. T. Winner Ready Later)



TURNER'S WEDELL-WILLIAMS RACER

'34 One of the most popular planes and pilots ever to win the Thompson Trophy Race. Known from coast to coast for its amazing speed, and its beloved pilot, Col. Roscoe Turner himself. This is the plane and pilot that won the 1933 Bendix race, and the 1934 Thompson Trophy Race. Turner then held records for crossing the U.S. both ways. He was forced out of first place in the 1935 Thompson race due to broken oil line. Model is a master duplicate in every detail, and flies with true Turner flash and zip. Authoritative W-W gold coloring. Span 19½". Complete Dry Kit SF-48, only..... **$2.35**

• ½" Dry Kit D-48, only 65c

TRAVEL AIR MYSTERY SHIP

'29 This beautiful ship in 1929 started a new era in landplane racer design and through many requests by those who wished to head their Thompson Trophy lineup with this kit, it was thoroughly redesigned. Recommended for exhibition contests. Span 21¾". Red with black scalloping, green trim. Complete ¾" Dry Kit SF-2, only **$2.35**

• ½" Dry Kit D-2, only 65c

LAIRD "SOLUTION" RACER

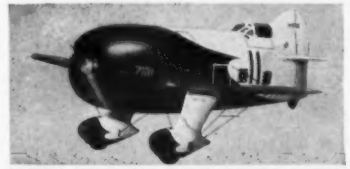
'30 Charles "Speed" Holman won the Thompson Trophy Race of 1930 in this biplane. Model is of recent C-D design and employs the best type of model construction. Recommended for those who want an attractive fast flying model. Span 15⅞". Laird gold and black ¾". Dry Kit SF-46..... **$1.95**

• ½" Dry Kit D-46, only 65c

BAYLES' GEE-BEE RACER

'31 This stubby little plane won the '31 Thompson Trophy Race. Had a very short fuselage which made it very maneuverable flying the pylons. Our model is redesigned and the most accurate model of its type on the market. Wing span 17⅛". Yellow and black. Complete ¾" Dry Kit SF-17..... **$1.95**

• ½" Dry Kit D-17, only 65c



DOOLITTLE'S GEE-BEE RACER

'32 The daring stubby design that took first place in Thompson Trophy Race of 1932. Major "Jimmy" Doolittle flew the course at an average of 252 M.P.H. which was the Thompson "high" record until the Caudron record of 1936. Make this unusual flying model. Span 18⅜". White with red scalloping. Dry Kit SF-27 ..... **$1.95**

• ½" Dry Kit D-27, only 65c

WEDELL'S WEDELL-WILLIAMS RACER

'33 Jimmy Wedell's own racer. Won Thompson Trophy Race with it in 1933 and later the land plane speed record. In 1934, Doug Davis won the Bendix Trophy with this same ship. Model is very accurate and excites interest and favorable comment everywhere. Span 19½". Red, black and bronze. Dry Kit SF-47, only **$2.35**

• ½" Dry Kit D-47, only 65c

FAMOUS "MR. MULLIGAN"

'35 This plane was reputed to be the fastest cabin plane made at the time it won the Thompson speed classic proving itself by flying over 220 M.P.H., winning the coveted trophy for 1935. No other Mulligan could ever be like it for your Thompson lineup. Complete ¾" Dry Kit, SF-52, only **$2.35**

FRENCH CAUDRON RACER

'36 A speedy flying little beauty of all blue. Has many interesting details, retractable landing gear, a neat "pin stripe" red, white and blue fuselage marking, etc., etc. Complete dry kit (meaning no liquids), span 16⅜", length 17⅞", ¾" Dry Kit SF-63, only **$1.95**

FREE! Plans for Building Scale Pylon included with each ¾" Model Kit

All C-D ¾" SF Kits contain: 1. The famous full-size authentic copyrighted C-D drawing with large photographs and plenty of instructions to suit its classifications of difficulty of building. 2. Plenty of the proper grade of Japanese tissue for covering. 3. All flat and printed balsa (including necessary fill-in wood). 4. All strip balsa wood. 5. All kits now contain turned wheels as described. 6. Red or gray advanced feature, indestructible ready to assemble flying propeller blades. 7. Finest (mechanical) music wire for fittings, not brittle imported wire. 8. Hinge wire for hinges. 9. A pilot head block only, with instructions for carving now in every kit. 10. All necessary well punched thrust washers. 11. Rubber strands for motors. 12. White pine strips or blocks whenever needed. These Kits DO NOT CONTAIN ANY LIQUIDS. **All C-D ½" DWARF Kits are like Miniature SF Kits, and contain absolutely everything needed—except NO LIQUIDS.**

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1933. No other Mulligan could ever be like it for your Thompson lineup. Complete 3/8" Dry Kit, SF-52, only **$2.35**

17¼", only ¾" Dry Kit SF-63, **$1.95**

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